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A Mock Epidemic of Typhoid Fever Used in Public Health Training*

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THE W. K. Kellogg Foundation has been coöperating for a number of years with the citizens of seven counties in southwestern Michigan—Allegan, Barry, Branch, Calhoun, Eaton, Hillsdale, and Van Buren—in a joint effort to improve the health, happiness, and well-being of children. This program is called the Michigan Community Health Project. It is built around the seven county health departments.

Few health officers have any actual experience with epidemics. No way exists to test plans, or technics, or to gain experience in the proper use of the necessarily extraordinary powers invoked at such times. In a real epidemic mistakes are costly, often tragic, and decisions have to be made under tremendous pressure. This is also true of war, and yet military forces are trained in actual maneuvers in war games. Could similar technics be developed to make mock epidemics useful in staff training?

The seven county directors agreed that an experiment should be tried. A Foundation executive was asked to arrange the problem, all details of which were to be secret except the date of onset. An army medical officer was invited to help prepare and direct the problem to provide both a broad experience in epidemiology and laboratory methods and a knowledge of war game technics.

OBJECTIVES

General objectives were discussed. Could a mock epidemic—

1. Train public health personnel for their respective rôles in epidemics?
2. Point out potential local channels through which epidemics could spread?
3. Test the adequacy and quality of facilities including laboratories?
4. Educate community groups to their public health responsibilities?

Typhoid fever was chosen for the first experiment. This decision was carefully guarded. Secrecy was necessary if the difficulties that exist in epidemiological investigation were to be reproduced even in part.

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PREPARATION

The problem directors studied the milk and water supplies and food establishments of the seven counties and investigated ways and means through which epidemics might spread.

A tentative selection was made of the channels to be used. It was important that the field exercise should point out the most dangerous hazards existing in the communities, and at the same time should illustrate as many methods of spreading the disease as possible.

A table was worked out for the invading organism showing times, places, and people. Minimum incubation periods were used to permit the problem to develop as rapidly as possible. This table was then translated into symptoms and illnesses in selected individuals. Only a reasonable percentage of known contacts could be infected. Only channels actually existing could be used to spread the disease.

The next question, obviously, was how to bring these simulated conditions to the attention of the health department staffs in a more or less natural way.

MECHANICS

Reporting—The first cases of a real epidemic would normally be reported to health departments by attending physicians. This could be simulated by reporting fictitious cases (names of real people, however). The health departments then could proceed in the normal way and would make whatever investigation the cases required.

Control agent—The problem directors would need a control agent in the county health departments. Field investigation of a theoretical case would of course reveal a healthy person, but the epidemiological investigation would be carried out just the same. The case history would be presented to the control agent on the investigator's return to the office.

Supplementary case histories—The control agent would then release the proper envelope containing the theoretical symptoms of that individual as of that date.

The next step taken by the health department might very naturally be to order the securing of specimens for laboratory examination.

Controlled laboratory specimens—Specimens would have to be furnished which would or would not be infected with actual organisms of the disease depending upon the theoretical course of the epidemic and whether or not organisms could be expected to be recovered at that time. A control laboratory was needed for the preparation of these specimens.

Laboratory agent—A special laboratory agent responsible only to the problem directors would be needed at each county health unit to transport the specimens and release them under proper conditions. Since these specimens would include positive cultures in blood or feces of living organisms, fellowship students with advanced bacteriological courses and experience with pathogens would carry this responsibility, and the normal routine observed with pathogenic organisms would have to be maintained.

Time interval—In a real epidemic it would be necessary for health unit personnel actually to visit and furnish instructions and containers to each individual from whom specimens were desired. Specimens would have to be picked up later. For the mock epidemic state laboratory containers properly labelled could be left with the laboratory agent. These would be sent to the problem directors' laboratory that evening and would be returned the next morning with specimens for analysis by the local laboratory. The time interval would approximate that required in a real investigation.

Blood specimens—When blood tests

were required the laboratory agents would have two blood stocks—one infected, the other not—from which samples could be taken after an appropriate time interval. The specimens would be unknowns to the health department, but the agent would present a positive or a negative sample after study of his key chart which would list all individuals who were supposed to have positive bloods at that time.

Non-personal specimens—All other samples, such as milk and water, would be obtained in the usual way and submitted to the laboratory agent properly identified. He would return all such specimens within an hour either properly inoculated or untouched, as the situation required. The health department would then analyze the samples through its usual facilities.

Epidemiological reports—Real people were to be used in this mock epidemic. The only assumption was that some were exposed to the initial infection. The physical condition of the exposed cases would be determined arbitrarily and primary cases selected where they might do the most damage. However, these primary cases could infect others only if they were actually in a position to do so during the period in question. This would have to be learned by field visits. The information learned by the health department in its regular epidemiological investigations would thus be important both to the departments in controlling the disease and to the problem directors in spreading it. Copies of the epidemiological investigation would have to be turned in so that the effectiveness of the measure employed could be judged. They should be turned in daily so that the problem directors could adjust the exercise to actual field conditions.

Identification—All epidemiological data would be recorded on regular forms, but a distinctive stamp would have to be provided the control agents for the proper identification of all problem papers. A skeletonized IMP was chosen for this purpose. All messages involved in the problem would be identified with the code word IMP. The problem directors' office became IMP headquarters, their laboratory the IMP laboratory.

Recording—Written copies of all orders bearing on the problem issued by county health department personnel or the field director would be filed with the local control agent. He would stamp the message with the IMP, the date, and the time, and turn them over to the problem directors at the end of the day. Only orders filed could be considered in effect. All problem papers would be addressed as if the situation were real, but would be routed through the control agents.

Field contacts—Actual field contacts would be made at the discretion of the county director. Properly handled they offered unusual educational opportunities. All individuals contacted in the field would be told the purpose of the problem. Of course, no actual restrictions would be enforced. All limitations of activities of individuals or institutions that county directors might wish to employ would be considered in effect when written instructions were received by control agents.

Judges were appointed to rule on the efficiency of all the measures taken. These officials would review all actions and decisions of the county health directors and would have access to all information possessed by the problem directors.

THE FUSE IS LAID

During the summer the county health directors devoted several meetings to the development of plans and facilities useful in the control of possible epidemics. They reviewed with their staffs the epidemiology of all common diseases and checked their com-

munities for potential danger spots. Many possible channels of infection known to the problem directors were eliminated by the health departments during this period.

The problem directors gave their preparations a final check in August. Necessary supplies were obtained. Arrangements were completed for a laboratory for the preparation of specimens. Guest books were left at roadside stands and resorts to be signed by all patrons during the period of theoretical exposure. Cases to be released were spotted on maps. A master chart was prepared for the problem directors which gave the exact times and methods to be used in releasing the cases and special instructions applying to the general situation. The case histories were keyed to this chart with a code number and filed in envelopes to be given the control agents of the appropriate counties on the dates specified. Procedures were outlined and instruction sheets made ready. New stories were prepared so that the public could coöperate on an intelligent basis and not misunderstand the project.

The preparations were complete.

THE SPARK

About the middle of August, a dinner meeting was held for food handlers from all seven counties. The program included a discussion of milk production and the importance of the food handler in the control of communicable disease. Later, members of the health department staffs were excused from the meeting, and after the food handlers were pledged to secrecy, the proposed mock epidemic was described and its purpose explained. All those present agreed enthusiastically to cooperate with the problem directors and to furnish health department investigators with complete information regarding their activities if called upon.

The menu included a number of old epidemiological favorites—cottage cheese, roast turkey with oyster dressing, whipped potatoes in cream, mashed squash, tossed salad, a chocolate eclair, and milk. Each person at the dinner signed his printed menu, scratched out any items he had not eaten, and turned it in. This record of food actually eaten by guests was made to establish definitely exposure to the theoretically infected food and to serve as a control over later epidemiological investigations.

On August 31, Colonel Fox arrived. A meeting was held with the fellows in public health engineering who were to serve as control agents and laboratory agents. Supplies were distributed and these men took their posts in the counties. The problem had begun.

THE EXPLOSION

From September 1 through 4, several cases of diphtheria, chicken pox, and other communicable diseases were reported to each county health department. These reports had no connection with the real problem. They prevented immediate identification of the nature of the epidemic, and served as a check on the efficiency of the control and reporting system. During this same period 10 cases of typhoid fever were also reported. These 10 cases were scattered through the counties and had one factor in common—they had all attended the special food handlers' dinner in August. Of some 323 guests invited to attend from the seven counties, approximately 40 theoretical cases of typhoid fever eventually developed.

Sporadic cases occurred in all counties. Some of these cases were in health department personnel, requiring transfers of responsibilities. Some caused alarm and apprehension concerning the possible development of secondary outbreaks which failed to appear.

Four secondary outbreaks became manifest due to ambulant or walking typhoids who contracted infection at

the dinner but remained on duty in dairies and food establishments. Outbreaks occurred in two raw milk dairies. A food handling outbreak resulted from a service club dinner, and a massive infection in a large children's home produced secondary cases in spite of previous immunization. One roadside restaurant spread the infection to distant points through tourists and bus travellers. The guest book showed that individuals from 32 states and Canada and points as far away as Shanghai, Rio de Janeiro, and the Canal Zone were exposed during the few days involved.

The mock epidemic was getting nicely started when the field exercise was terminated at 6:00 P.M. on September 10.

THE MACHINERY BEGINS TO WORK

Coöperative individuals who had attended the August dinner reported themselves ill to the health department or were reported by IMPersonated physicians. Field investigations were made exactly as though the persons were really sick. Epidemiological reports cleared through the control agents. Supplementary case histories were delivered. Empty, properly labelled containers were turned in, giving notice of intention to take laboratory specimens. After due lapse of time the laboratory agents returned these containers to the health departments with specimens appropriate for the predetermined theoretical case histories. Laboratories ran the specimens in the usual way. The health directors wrote out specific orders for control measures and filed them with the control agents, who brought them in to the judges in the evening.

The essential facts about the reported cases were quickly pooled by the seven county health officers, and the connection with the food handlers' dinner in August was shortly established.

STUDENT TRAINING

A fellow in public health administration was asked by the county directors to investigate the food handlers and the food served at that dinner. He made a complete investigation of the hotel, pastry shops, and other places involved, including the ice plant. He uncovered cross-connections, incomplete pasteurization of the milk products, and other interesting potential hazards. Each item of the food was traced, and occasionally conditions were experimentally reproduced. For example, another turkey was prepared in the same kitchen. Temperatures were taken of the oyster dressing both during the preliminary cooking and while the turkey was being roasted. Results showed that the processes used would not kill any pathogenic bacteria present. Theoretical specimens were taken of all food handlers who had helped prepare the dinner. The infection was finally traced to a man who prepared the filler for the chocolate eclairs.

LABORATORIES

The problem tested the regular county laboratory facilities as well as the health department's knowledge of how to use them. One laboratory was swamped with routine analyses, and confirmation tests were difficult to obtain when they were most needed. Laboratory technics were brought up to date. New media for making shorter differential diagnoses were tried out.

After enough samples had been run through the county laboratories to serve the purpose, the IMP state laboratory undertook to do all the laboratory work on paper without actual samples, but with proper time allowance. One of the problem directors took the place of the laboratory director and reported the scientific results directly to the county directors. This made it possible to evaluate the health director's interpretation and use of such data.

The exercise demonstrated the need for additional laboratory services in the area in time of epidemics.

THE PRESS

To test the ingenuity of the county directors in dealing with a hostile press, scare stories were released in extras, sample copies of which were actually run by coöperating newspapers and placed on the desk of the director without warning. The staffs then had to deal with a theoretically excited public and antagonistic press.

RECORDS

During the last two days of the problem, the health departments were required to work only from their own office records so that the value and completeness of these records could be tested. During this stage raw milk routes became involved. The elimination of field visits kept the customers from being unduly alarmed as a result of the health department's activities.

EDUCATION OF MILK DEALERS

Visits were made, however, to the milk plants involved, and the conditions that had theoretically developed were explained when the histories were taken.

One dairy found to its chagrin that its recording thermometer had broken down and there were no records to prove that pasteurization had occurred during the days when the milk might have carried the disease to their customers. For the first time the manager understood how this device protected him as well as the public.

Many food handlers who were quite conscientious about not working when they were sick had not recognized the danger of passing on an infection during the incubation or pre-symptom stage or the potential danger of a healthy carrier.

Under the emphasis and enthusiasm of the game in which they took part, the lay people understood the need for the health department regulations as they never had before.

LAWS OF CHANCE

The use of real people proved of inestimable value in producing unpredictable situations. For example, one secondary outbreak was caused by the fact that no control measures were taken at a resort since the cook who had attended the August dinner had resigned and had been replaced by another person. The hurried investigation made by the health department failed to disclose that the cook had stayed long enough to expose a large number of people at a 3 day meeting, and a second outbreak occurred. Events of this type gave the problem a realism that could be achieved in no other way.

JUDGES EVALUATE METHODS

The judges reviewed the action taken by the invading organisms and the health department staffs each day. They traced the epidemic on their own charts and prepared statements on the relative effectiveness of procedures chosen by health departments for control. These comments formed the basis of the discussion at the staff critique on the day following the conclusion of the problem.

CRITIQUE

This critique was attended by the judges, the problem directors, county health directors, the Foundation consultants, the Michigan State Health Commissioner, and representatives of the U. S. Public Health Service. A history of the outbreak as it would have been officially recorded was presented by the problem directors, illustrated with complete charts and tables. The judges led the discussion of the relative effectiveness of the various

control procedures in relation to patients, contacts, laboratories, physicians, newspapers, and the general public. Additional measures that might have been taken were pointed out. The general county defenses against epidemics were reviewed and special danger zones revealed by the problem were emphasized. The technics used in the mock epidemic were criticised.

EVALUATION OF METHODOLOGY

The methods used in developing and controlling the problem worked effectively with a few exceptions. Some lay persons overacted their parts. The same purpose could have been accomplished with impersonated telephone calls and written directives released at predetermined times.

One control agent assigned to each department could probably perform the functions of the control agent and the laboratory agent satisfactorily. This would simplify administration.

The reproduction of actual food processing and food handling technics demonstrated the effectiveness of experimental methods in epidemiology.

The impersonation by a problem director of private physicians, fathers, and the laboratory director, presented unusual opportunities to evaluate the county director's handling of these important contacts as well as to improve their effectiveness.

If the impersonated telephone conversations had been recorded and reviewed at the critique, their instructional value would have been still further enhanced.

The discussion of control measures by impartial but sympathetic judges taught the staffs the relative importance of measures taken.

As a result of the mock epidemic a manual was prepared for the use of the county health departments, listing the entire resources and facilities of the area that would be useful in combating any epidemic threat, and tentative plans were made to deal with typical situations.

The cases were so distributed in the various counties and in point of time that the regular duties of the departments could be carried on without conflict.

CONCLUSIONS

Mock epidemics or "health problems" can be prepared and staged that will give existing health agencies experience in the control of outbreaks of disease second only in value to experience gained by actual contact with epidemic conditions.

Both the period of preparation and the actual problem are of inestimable value in the training of personnel.

The study of points of vulnerability occasioned by the problem suggest new technics for determining program emphasis.

The problem offers an excellent method of testing health department, hospital, and medical records, facilities, and laboratories.

The success of the problem in the education of food and milk handlers was beyond all expectations.

This experience would suggest that the same plan can be used in preparing health departments to meet other emergencies such as floods, cyclones, earthquakes, and fire.

After the technic has become sufficiently standardized the "health problem" may have possibilities as a test of the efficiency of health department personnel and equipment.

Bacteriological Indices of the Sanitary Quality of Market Cream*

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THE public health laboratory is called upon to determine the sanitary quality of market cream as the consumer purchases it. Cream when it ultimately reaches the consumer may be very different bacteriologically from cream which has just been separated. By and large, cream is handled no more carefully from production to sale and from pasteurization to sale than local laws and regulations require. Consequently, a selection of laboratory tests should be made only after a careful consideration of local requirements governing production, handling, and storage of the product. Caulfield, Nelson, and Martin [1] have suggested that no single test, but rather several chemical and bacteriological procedures be used. Too frequently the problem is thought solved from a bacteriological viewpoint merely by the performance of a standard plate count.

Chilson and Collins [2] have reported good results with the resazurin test in determining bacteriological quality of cream not over 48 hours old. These authors report that cream samples stored at 40° F. or lower for 4 or more days do not give reliable results and, therefore, they do not recommend that method of testing for any but fresh samples. Accordingly, this test is not practicable in Connecticut, since there is no restriction upon age of cream for retail sale. A short study in which samples were subjected to resazurin and methylene blue reduction tests yielded such unreliable results on samples of unknown age that this line of investigation was dropped.

The value of the coliform and phosphatase tests for the examination of pasteurized cream has been sufficiently well established to call for no special comment here. These technics are rapidly becoming fixtures of the modern control laboratory.

TESTS ON CREAM SAMPLES RECEIVED ROUTINELY

In a previous publication [3] the authors reported that in a study of 500 market creams, including both raw and pasteurized samples, the 37° C. standard plate count failed to give as many high counts as were demonstrated by an 8° C. plate count. Samples showing high counts at 55° C. were so few as to indicate that thermophilic bacteria were of no significance in that series. It was further shown that the direct microscopic clump count "failed" many more samples than did any of the plate counts. That study has been extended over a period of 18 months to include a total of 730 samples in an effort to determine the laboratory methods best

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suited to serve as indices of sanitary quality for Connecticut market cream.

During that part of the study previously reported, the samples (approximately 75 per cent of the final total) were plated in triplicate, using "Standard Methods" glucose tryptone skim milk agar. One set of plates was incubated at 37° C. for 48 hours; another set, at 55° C. for 48 hours; a third set, at 8° C. for 4 days. Charts of recording thermometers indicate that the 37° C. incubation was actually conducted within the range 35°–37° C., with the upper limit a maximum reading never recorded during more than a small fraction of the incubation period. The remaining cream samples (25 per cent) received this same treatment, supplemented by a fourth set of plates incubated at 20° C. for 48 hours. Direct microscopic clump counts were made on all samples. All the samples of pasteurized cream were inoculated into brilliant green lactose bile (2 per cent) for the determination of coliform organisms and were tested for phosphatase.

The cream samples were of three types:

1. Raw retail cream samples. These had received no heat treatment.
2. "Import" cream samples (many pasteurized or heat-treated at the source). It is required by law that these be pasteurized within Connecticut before being offered for sale on the retail market, whether or not they have been pasteurized elsewhere.
3. Retail pasteurized cream samples. These include both cream produced locally and imported cream after pasteurization in Connecticut. A considerable proportion of the latter group may have been repasteurized.

Table 1 shows the percentage of samples which failed to meet the standards (exceeded a limiting value of 500,000 per ml.). The legal plate count standard at 37° C. for 48 hours in Connecticut is 500,000 colonies per ml. and in this study we have accepted that figure as the limiting value for plate counts made at the other temperatures, and for microscopic clump counts.

The direct clump count failed many more samples than did plate counts at any temperature except in the case of the small number (40) of raw retail cream samples for which a 20° C. plate count gave results comparable to the clump count. The percentage of failures by the clump count was relatively uniform for all three types of samples.

A few samples of frozen cream, some 2 or 3 months old and one 53 weeks old, were included among the samples tested. None of these gave a high count by any method.

The results obtained by the standard plate count at 37°C. would, by themselves, give the impression that good cream was being imported but that raw and pasteurized retail cream was of only fair quality. Judged by this standard, all three types of cream were of much better quality than was indicated by the direct clump counts.

TABLE 1

Results of Tests on 730 Samples of Raw, Import and Retail Pasteurized Cream

	Raw		*Import*		*Retail Pasteurized*	
Test	*Total*	*% Failing* *	*Total*	*% Failing* *	*Total*	*% Failing* *
37° C.—48 hours plate count	149	30.8	336	12.5	245	24.4
55° C.—48 hours plate count	149	0	336	0.5	245	4.8
20° C.—48 hours plate count	40	47.5	138	28.2	84	29.7
8° C.—4 days plate count	149	29.5	336	19.0	245	30.2
Direct microscopic clump count	149	45.6	336	44.6	245	53.8
Tests for coliform organisms	...	....	302	59.2	217	72.3
Phosphatase test	...	....	310	4.1	234	12.3

* Having counts over 500,000 per ml.; showing coliforms present in 1 ml. or less; or having phosphatase values greater than 0.05 mg. phenol by the Gilcreas-Davis modification of the Kay-Graham test.

Results of 55° C. plate counts showed the thermophilic group of organisms to be of minor importance, although a slight tendency toward an increased incidence of these forms was observed in the retail pasteurized group. Recalling that much of the cream in this group had been twice subjected to pasteurization, the observed increase was less than had been anticipated.

Results of counts at incubation temperatures of 8° C. and 20° C., contrasted with the findings by 37° C. incubation, indicated the presence in the samples of appreciable numbers of organisms capable of growing at refrigerator temperature but probably having optimal growth temperatures confined to the lower portion of the range ordinarily assigned to the mesophilic bacteria (in the neighborhood of 20° C.). This is particularly true of samples giving high counts. Limitations of time and facilities made it impossible to make plate counts at 32° C. but it is improbable that this variation from the 35°–37° C. range would have effected any change in these conclusions.

The results of the tests for coliform organisms seem to indicate that an undesirable situation must have prevailed generally in the handling of market cream after pasteurization, since the phosphatase tests did not show a surprisingly high percentage of underprocessed cream. It is very significant that the results of the direct counts reflected this situation to a much greater degree than did plate counts at any temperature.

The type of flora found in the high count cream samples deserves special notice. Samples with high direct counts but low plate counts showed a mixed flora on direct examination, but the majority were observed to contain forms simulating the vegetative cells of spore-forming rods, often in large numbers. The same morphological type of organism was frequently observed also in samples giving both high clump and high plate counts. Organisms isolated from plates incubated at 8° C., 20° C., and 37° C. were not, however, of this type but were usually of three groups: lactic types, coliforms, and pseudomonads. This last group was isolated frequently from the 20° C. plates but very seldom in large numbers from any one sample.

In the case of pasteurized samples, these observations could be explained in one of the two following ways: (1) The rods observed in direct smears were organisms which had been killed by pasteurization but had retained affinity for methylene blue; or (2) these were live forms, incapable of growth under incubation conditions to which they were subjected. It is pertinent that like forms with similar behavior were found in raw cream, although in fewer numbers. If these were viable forms of sporogenic bacilli, as their morphology suggested, the failure to initiate growth on "Standard Methods" agar is not surprising, since the reaction of spore-formers to a changed environment is little understood and entirely unpredictable unless confined to a narrow range of experimental conditions.

SPORE FORMERS IN MARKET CREAM

It was decided to test certain of the factors influencing the development of spore-forming rods occurring under market conditions in cream. The inoculation of pure cultures into sterile cream was not considered of as much value as a study of behavior of sporogenic types comprised in the "natural" inoculum. Therefore, a series of cream samples was heated to 80° C., held there for 30 minutes, and then cooled immediately. A microscopic clump count was made on each sample, which then was divided aseptically into two portions. One portion was placed in the icebox (6–8° C.); the other was incubated at room temperature. The portions of cream held

in the icebox were examined by direct count at the end of 24, 48, and 72 hours, and at the end of the 6th and 7th day. Microscopic clump counts on the portions held at room temperature were made at hourly intervals during the first 11 hours and also after overnight incubation (about 21 hours). The results of this experiment are summarized in Table 2.

TABLE 2

Effect on the Direct Microscopic Clump Count of Heating Cream at 80° C. for 30 Minutes and of Subsequent Incubation at Room Temperature and at 8° C.

	Direct Microscopic Clump Count per ml.								
			Incubation at Room Temperature for					*Incubation at 8° C. for*		
Sample Number	*Before Heating*	*After Heating*	*3 hr.*	*6 hr.*	*9 hr.*	*11 hr.*	*21 hr.*	*48 hr.*	*6 da.*	*7 da.*
979	20,000	20,000	20,000	20,000	2,060,000	12,360,000	Over 100,000,000	20,000	20,000	20,000
980	240,000	40,000	20,000	140,000	1,640,000	9,040,000	Over 100,000,000	20,000	20,000	40,000
981	180,000	20,000	20,000	60,000	3,660,000	22,000,000	Over 100,000,000	20,000	20,000	20,000
982	1,200,000	60,000	520,000	1,140,000	1,110,000	8,280,000	6,060,000	20,000	60,000	12,000,000
983	4,320,000	2,640,000	1,860,000	5,840,000	3,300,000	10,200,000	16,200,000	6,600,000	7,800,000	9,600,000
984	1,400,000	120,000	20,000	140,000	200,000	2,240,000	Over 100,000,000	20,000	20,000	20,000
985	80,000	20,000	20,000	20,000	20,000	800,000	24,000,000	20,000	2,660,000	2,800,000

The microscopic picture presented by the heated cream when held at room temperature was that of spore-forming bacteria undergoing rapid vegetative development. The first sharp rise in numbers occurred sometimes as early as the 6th hour, sometimes at the end of 8, 9, or 10 hours. As the count increased, the number of organisms per clump also increased. The similarity of the organisms to those previously described as present in market cream was striking. The morphological types of bacilli which developed during room temperature incubation of these heated samples grew well on plates incubated at 20° C.

The ability of certain of these spore-forming organisms to grow in cream at low temperature (6–8° C.) is shown beyond question of doubt by samples 982 and 985. The type of organism observed was the same as that found after storage at room temperature. Certain samples (979, 980, 981, 984), however, showed no increase in count when held for a full week in the refrigerator, but in every case these were samples containing relatively few resistant forms originally as shown by low counts made immediately after heat treatment.

A further observation may be made from Table 2, with regard to the staining behavior of organisms after being subjected to killing temperatures, by comparing direct counts made before heating the cream with counts made afterward. With the exception of sample 979, which had a low count in the beginning, all samples showed a reduction in the number of clumps of bacteria capable of taking the stain. The reductions ranged from 39 to 95 per cent depending, apparently, upon the number of organisms in a heat-resistant stage at the time of heating. Similar reductions in direct counts have been noted in our laboratories in milk samples subjected to laboratory pasteurization.

DISCUSSION

Determination of the sanitary quality of cream can conceivably be made by

using one or more of three general procedures: (1) Enumeration of the total bacterial population, (2) enumeration of special types of bacteria, or (3) determination of the degree to which bacterial growth has affected the product. This study is concerned primarily with the first procedure, since the others, although valuable, are but supplementary to it.

So long as the method chosen for enumeration of total bacterial population is rigidly standardized, precise enumeration need not be the ultimate goal. On the other hand, it is essential to have reasonably accurate knowledge of the extent to which results of a laboratory test must be qualified. It is our contention that the direct microscopic count offers the most logical and most fundamental approach to the problem and that its use will result in better control of the product under test by furnishing knowledge of the types of organisms responsible for an unsatisfactory product.

All plate counts, whether made under conditions specified in "Standard Methods" or under modified conditions, have limitations which can exercise an effect over a range too broad and unpredictable to permit a sufficiently exact interpretation of results. Our results indicate that selection of lower temperatures for incubation of plates made from cream samples results in counts more nearly in agreement with the direct microscopic clump count.

Objection may be raised concerning the validity of a direct count on a sample which has been subjected to pasteurization. The single strong objection to this method is the possibility that killed bacteria may be counted. While this objection cannot be discounted entirely in the absence of experimental evidence to the contrary control officials regard it too seriously since the aim of control is as much to subject a good product to pasteurization as to insure a satisfactory and safe final product.

In answer to this objection, our results suggest that the average period of cold storage of samples prior to examination in a public health laboratory establishes conditions under which only a minimum number of bacteria of questionable viability will stain. In our experience, borderline microscopic counts are rarities if a standard of 500,000 clumps per ml. is used. Counts are either well below or far above that figure. This is significant when we consider the experimental work on milk of Hastings and Davenport [4] who demonstrated that a decrease in microscopic count occurs after pasteurization, that the decrease in many cases is a large one and that further decrease may occur during storage at low temperatures.

Even when the phosphatase test proves pasteurization to have been performed effectively, a high direct count on a cream sample justifies one of the following conclusions: (1) The product was of poor bacteriological quality when sampled, as a result of improper handling, or (2) it was an inferior product before pasteurization. Either of these conclusions provides adequate reason for control officials to require corrective action. The results of tests for coliform organisms on the series of samples included in this study lead us to believe that the former conclusion will, in general, prove to be more probable. In our study, coliform organisms were present in market cream to an extent which cast serious doubt upon the efficiency of methods of handling and storing following pasteurization. This is not surprising, since no regulations are in effect in Connecticut to require refrigeration of cream at all times between pasteurization and sale or to limit the age of cream which may be offered for sale. Consequently, chances of bacterial multiplication are often as great in pasteurized cream as in raw cream particularly

if thermoduric mesophiles are present.

The demonstration in direct counts on cream of organisms morphologically similar to the sporogenic bacilli is strikingly similar to observations made on milk by Robertson, Yale, and Breed.[5] Those authors were unable to grow these organisms from pasteurized milk by ordinary plating methods, although their presence was noted in direct smears.

We have shown that market cream may contain considerable numbers of spore-forming organisms in a heat-resistant stage, but in no case were we able to isolate by plating methods more than an occasional spore-former, even though large numbers of colonies were fished and examined. Therefore, we believe the direct microscopic count is the best method for detecting these bacilli, which we have shown capable of producing in cream enormous numbers of progeny, in the absence of or even in the face of storage at refrigerator temperatures.

SUMMARY AND CONCLUSION

Results of a comparative study of methods for the enumeration of bacteria in raw and pasteurized cream offered for retail sale indicate that the direct microscopic clump is the most satisfactory and practical method for this purpose, especially if the sample, when pasteurized, is supplemented by a coliform determination and a phosphatase test. The standard plate count (35°–37° C. incubation) is less satisfactory than plate counts made at incubation temperatures of 8° C. and 20° C. Plate counts at 55° C. for thermophilic organisms were of significance for certain samples but had little value for routine testing.

Experimental evidence is cited to show that market cream may contain appreciable numbers of sporogenic bacilli able to survive for 30 minutes temperatures considerably higher than that of pasteurization. These organisms are capable of rapid development in cream at room temperature (20° C.) and in many cases, of multiplication at a somewhat slower rate at refrigerator temperature (8° C.). These organisms are detected by a direct microscopic count, but do not ordinarily produce colonies on plates of " Standard Methods " agar incubated at 8° C., 20° C., or 37° C., and only rarely develop at 55° C. Consideration of the manner of distribution of cream on the retail market in Connecticut shows these observations to be of great importance.

The contention that bacteria killed by pasteurization may be counted by the direct method is of little practical significance when consideration is given to the fact that direct clump counts are almost invariably either well below or far above fair limiting values for judging sanitary quality. A direct count in millions per ml. indicates that a cream either contains an extremely large number of viable bacteria or was an inferior and unsanitary product before pasteurization. Furthermore, when large numbers of sporogenic rods are present, it is probable that the bacteria observed are viable, since pasteurized cream is very frequently distributed under conditions which are favorable to the growth of these thermoduric bacteria.

The main advantage of the direct count over the standard plate count, besides ease of manipulation, is the procurement of data on types of organisms present, giving directional guidance to corrective control measures. Furthermore, in a large number of cases, the results of the direct count agree with results of coliform tests that indicate improper handling after pasteurization when plate counts seemingly indicate cream of good quality.

Considering the advantages and the limitations of the direct microscopic clump count as contrasted with those of a standard or a modified plate count, the direct count is superior as an index

of the sanitary quality of market cream, whether raw or pasteurized.

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San Francisco's Pasteurization Ordinance Finally Upheld

IT has been reported by J. C. Geiger, M.D., Director of Public Health in the City and County of San Francisco, that an ordinance banning the sale of milk in San Francisco, except certified, unless it was pasteurized, which was passed in 1933 by the Board of Supervisors, was finally upheld as a proper exercise of the police power by a decision of the Supreme Court of California rendered April 2, 1942.

Outlining the development of this legislation, Dr. Geiger stated that the request for the pasteurization of all milk supplies, except certified, was brought to a focus by the situation existing in San Francisco in 1932, at which time approximately 2 to 3 per cent of the fluid milk supply was of a raw grade designated as guaranteed, and that tuberculin testing of animals was not universal or complete.

The Director of Public Health barred the distribution of guaranteed raw milk because of the fact that the inspection given by the Department of Public Health to dairy farms producing this type of raw milk was inadequate and, therefore, the production, handling, and distribution of guaranteed raw milk created a potential danger to the public health. Under the then existing conditions, sufficient personnel to cover the duties imposed on inspection services necessary to safeguard the production, handling, and distribution of raw milk was not available. In the case of the production, handling, and distribution of certified milk, the inspection service provided by the Milk Commission of the San Francisco County Medical Society was entirely adequate, and the inspection service was frequent and performed by dairy veterinarians and physicians. This type of milk was later pasteurized and finally voluntarily eliminated.

The Natural Milk Producers Association, an organization composed of grade A raw and guaranteed raw milk producers, contested the ordinance of 1933 banning the sale of raw milk, except pasteurized, by applying to the Superior Court for a permanent injunction. This was denied in 1933. In 1938 the Superior Court upheld the ordinance and in 1941 the District Court of Appeals unanimously affirmed this decision. In upholding the provisions of the ordinance the Supreme Court in its 1942 decision stated: "It cannot be doubted . . . that the requirement that all milk for human consumption be pasteurized is a proper police regulation."

The Nasopharyngeal Swab in the Diagnosis of Pertussis*

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BRADFORD, Slavin, and Brooks [1, 2] have adapted the nasopharyngeal swab, which has been routinely used in the diagnosis of pneumonia, to the diagnosis of pertussis. The purpose of this communication is to compare the results obtained by this new method with that of the cough plate originally described by Chievitz and Meyer [3] in 1916. There have been numerous reports on the latter method.[4-17] It has been found highly satisfactory in the hands of the experienced but has not come into general use. Difficulties have been (1) inducing a cough at the time one has the plates (particularly difficult in infants), (2) transporting the plates, and (3) identifying *Hemophilus pertussis* on a plate crowded with colonies of other microorganisms. Another common problem is that of having sufficient sheep or horse blood available to make the media.

The nasopharyngeal applicator advised by Bradford and Slavin and used by the writers is "a small bit of cotton tightly wrapped about the end of a thin, flexible copper wire." It is passed through a nostril into the nasopharynx. Therefore, it must be much smaller than the usual swab used for taking nose and throat cultures for diphtheria. Great gentleness is required. The child's head must be immobilized. If resistance (a large turbinate, deviated septum or adenoids) is encountered, the applicator should be withdrawn and inserted in the other nostril. It is, of course, sometimes quite impossible to pass even the smallest applicator.

The insertion of the applicator into the nasopharynx very often induces coughing. The applicator should be left there for two or three of the coughs. Incidentally this procedure is a very effective one for obtaining well exposed cough plates. We have usually exposed them at this time. The applicator is then withdrawn and placed in a sterile test tube.

Petri dishes of Bordet-Gengou medium (the same as used for cough plates) are then inoculated lightly by touching the medium three times with the applicator. A sterile platinum loop is used to "dolly" across the medium through the spots inoculated. We have routinely inoculated two dishes with each swab. If a purulent nasal discharge is present, the medium is touched only once with the contaminated swab and preferably more than two dishes are inoculated.

The cough plates herein reported were taken in duplicate on only about half of the individuals tested. If duplicate plates had been taken with more regularity, our results with them would have been better.

* Read before the Laboratory Section of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, N. J., October 17, 1941.

The medium we have used is described in the footnote.* We do not wish to go into the merits of the various formulae described. Ours is essentially that used at the Serum Institute in Copenhagen. The inoculated plates are examined after 2, 3, or 4 days of incubation. Colonies are selected for staining by their pearl-like, shiny appearance when the media is tilted toward a desk lamp in a darkened room. All strains isolated were identified by the usual cultural methods. Agglutination tests were performed only occasionally.

pected in a public health unit where tests were made by a large number of individuals.

Table 1 summarizes the results of 210 comparative tests on 152 cases of pertussis seen during the past 17 months. The recorded cases which were bacteriologically negative were diagnosed on the basis of typical clinical findings. There is no doubt that we missed the diagnosis in some atypical cases of pertussis, for a number of bacteriologically proven cases were very mild or atypical. These latter cases of *Hemophilus pertussis* in-

TABLE 1

A Comparison of Results with Cough Plates and Nasopharyngeal Swabs
210 Tests on 152 Cases in which Both Cough Plate and Swab Were Used

Week of Disease	Both Plate + Swab +	Plate + Swab −	Swab + Plate −	Both Plate − Swab −	Total	% + By Swab	% + By Plate	% + By Both
1st	26	6	13	10	55	71	60	82
2nd	21	4	19	20	64	63	39	69
3rd	4	4	11	20	39	38	20	49
4th	7	3	3	9	22	45	45	58
5th	...	1	4	9	14	...	...	...
6th	...	...	...	6	6	...	...	...
7th	...	1	...	8	9	...	...	...
8th	...	...	...	1	1	...	...	...
Total	58	19	50	83	210	51	37	60

The nasopharyngeal swab and cough plates were taken by many different physicians and nurses often inexperienced in the procedures. The results therefore are by no means as satisfactory as might be obtained. The percentage of positive cough plates is definitely low as compared to results obtained by other workers.[4-17] On the other hand, our results indicate what might be expected in a public health unit where tests were made by a large number of individuals.

fection would have been missed clinically. Two cases of parapertussis have been encountered since this study began. (The authors have recently reviewed 10 cases of this latter infection[18] seen during the past 4 years.)

Confirming the findings of Bradford and Slavin, Table 1 indicates that the nasopharyngeal swab yielded a higher percentage of positive tests than the cough plate. There were 50 tests in which the swab was positive and the plate negative as compared to 19 tests in which the swab was negative and the plate positive. The oft repeated observation that the earlier the cough plate is taken the more likely it will be positive, holds also for the nasopharyngeal swab.

* Preparation of medium: 500 gm. of peeled, sliced potatoes are cooked until soft in 1 liter of tap water containing 40 ml. of glycerine. The potato mixture is filtered through 4 thicknesses of cheesecloth; 125 ml. of filtrate are added to 12.5 gm. of agar, 5 gm. of neopeptone, and 375 ml. of 0.6 per cent sodium chloride in a 1 liter flask. The medium is sterilized for 30 minutes at 15 lb. pressure. For use, 250 ml. of defibrinated horse blood, slightly warmed, are added to the melted agar, cooled to approximately 45° C. About 20 thick plates of medium can be poured from this volume.

TABLE 2

The Isolation of Hemophilus Pertussis by Cough Plate and Nasopharyngeal Swab From 154 Cases of Pertussis

(Some of these cases were not seen until the 5th or 6th week of cough)

	Both Plate + Swab +	*Plate + Swab —*	*Swab + Plate —*	*Both Negative*	*Total*	*Total Swab +*	*Total Plate +*
Number of Cases.....	60	15	38	41	154	98	75
% of Total Cases.....	39	10	25	27	73+	64	49
% of + Cases.....	53	13	34	...	...	87	66

It is also apparent that the use of both procedures is superior to the use of nasopharyngeal swabs alone.

Table 2 lists 154 cases studied and shows the percentage of cases (not the number of tests) which were positive. It should be mentioned that a few of these cases were not seen until the 5th or 6th week of cough. Sixty-four per cent of all cases were positive by swab at some time during their course, whereas 49 per cent were positive by plate. Eighty-seven per cent of the bacteriologically proven cases were positive by swab as compared to 66 per cent positive by plate.

In order to determine the viability of *Hemophilus pertussis* on the nasopharyngeal applicator, a considerable number of the applicators were placed in the electric refrigerator at 2° C. after they had been used to inoculate media. Of 41 applicators which were subsequently found to be positive on the initial streaking, 4 of 11 were again positive after 1 day of refrigeration, 3 of 19 were again positive after 2 days of refrigeration, and 2 of 10 were again positive after 3 days of refrigeration. It is apparent that *Hemophilus pertussis* may occasionally remain viable in mucus imbedded in cotton for 3 days at this temperature. It is also apparent that isolation of the organism is facilitated by prompt inoculation on media and incubation.

Bradford and Slavin [1] noted that "sometimes the growth from the nasopharyngeal cultures was practically pure." We have also noted this. Very heavy growth is often encountered.

Further studies are being made to determine in particular, (1) the duration of carriage of *Hemophilus pertussis* in the nasopharynx during pertussis, and (2) the presence of *Hemophilus pertussis* in the nasopharynx of contacts.

The advantages of the nasopharyngeal swab technic as compared to the cough plate appear to be:

1. Higher percentage of positive cultures
2. Ease of transportation
3. Speed in obtaining the inoculum

The disadvantage to the method is the discomfort involved.

SUMMARY

The nasopharyngeal swab of Bradford and Slavin has been compared with the cough plate in the bacteriological diagnosis of pertussis. Two hundred and ten duplicate tests were made on 152 cases in all stages of the disease. *Hemophilus pertussis* was isolated more frequently by swab than by plate. The use of both procedures, however, was superior to the swab alone.

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A Comparison of Methods for the Determination of Carbon Monoxide*

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THE 1940–1941 report of the A.P.H.A. Subcommittee on Chemical Methods in Air Analysis dealt with the determination of carbon monoxide. In the preparation of that report it became apparent that although certain methods were in constant use for the estimation of concentrations of carbon monoxide, very little had been done to evaluate them by comparison with other accepted methods when sampling the same environment. The investigation we are reporting here is an attempt to do this.

Six methods were included in this study. They are the iodine pentoxide method, the hopcalite indicator, the Hoolamite detector, palladium chloride ampoules, the British palladium chloride method, and the pyrotannic acid method.

The carbon monoxide test mixtures were prepared by generating the gas from formic and sulfuric acids. This carbon monoxide gas was then used to make up the carbon monoxide—air mixtures. An empty compressed air cylinder was used to store the carbon monoxide—air.

For the iodine pentoxide method, sampling was accomplished as follows:

The sampling tube A with both stopcocks open is totally immersed in the water contained in cylinder B. The gas is then allowed to flow in through stopcock C, displacing the water in A. Stopcock C is now closed, the sampling tube A is raised to within about an inch of the surface of the water and then stopcock D is closed. This leaves the gas in the tube under a slight positive pressure. The tube is allowed to come to room temperature and the pressure within the tube is equalized before analysis by momentarily opening the stopcock.

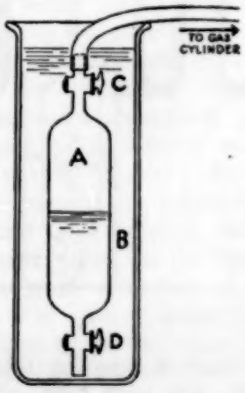

FIGURE 1

The principle of this method is the reaction of carbon monoxide with iodine pentoxide to form iodine and carbon dioxide. The amount of iodine formed is then determined volumetrically.

The iodine pentoxide apparatus itself

* Read before the Industrial Hygiene Section of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, N. J., October 15, 1941.

has been slightly modified and the gas sample is analyzed as follows:

Air is drawn through the apparatus from the outside, passing through tube A which is filled with calcium chloride, tube B which contains ascarite, then through 3-way stopcock C, through tube D which contains ascarite, and E which contains magnesium perchlorate, through the liquid air trap F into the iodine pentoxide tube G, and through the iodine absorption tube H. I is a glass stopcock, J is a " T " which serves as a bleeder valve to regulate the rate of flow. The sample in K is drawn up through the stopcock C and continues through the apparatus in the same way as the air. Absorption tubes A, B, C, D, and E are sealed off at the top after being filled. The liquid air trap F was blown in the laboratory. The iodine pentoxide tube G is a Kraissl tube and the iodine is absorbed in a Bowen absorption bulb H.

TABLE 1

Concentration of CO % (by volume)	*Sample Tube Capacity in ml.*	*Ml. of N/1,000 Arsenite Solution*
0.01	1,000	1.8
0.03	1,000	5.4
0.10	1,000	18.0
0.25	300	13.0
0.40	150	11.0

It was found that about 75 ml. per minute was a good rate for the introduction of the sample into the iodine pentoxide apparatus, and that 15 minutes was sufficient for flushing. After the apparatus was conditioned by passing air through it and keeping the iodine pentoxide at 200° C., blanks on outside air gave no color with starch and potassium iodide even after running hour after hour and in between determinations.

No difference was observed whether or not the liquid air trap was used. This is of course only true of our synthetic carbon monoxide—air and outside air samples.

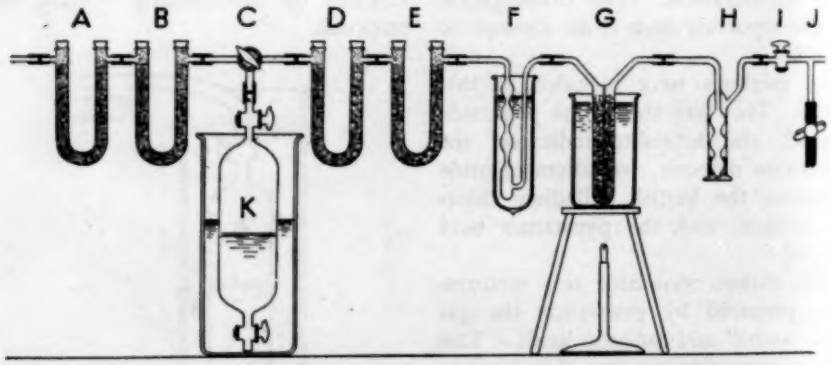

FIGURE 2

Three sizes of sampling tubes were used—150, 300, and 1,000 ml. The volume of N/1,000 sodium thiosulfate or sodium arsenite solution needed for a single titration is given in Table 1.

These values are only approximations and serve to indicate the size of sampling tube that is necessary depending upon the carbon monoxide concentration.

Corrections for temperature and pressure make differences in the second decimal place, as for example, 0.250 per cent uncorrected against 0.277 per cent corrected.

The effect of varying concentrations of potassium iodide in the absorber was determined. We found that 20 ml.

of a 2 per cent solution and over was satisfactory. Three per cent is probably optimum considering the subsequent titration. We investigated solutions from 0.025 to 5 per cent.

The effect of temperature on the iodine pentoxide reaction was also studied—140°–155° C. was found to be the best range. Above 155° there is a slight increase in the values obtained. This is probably due to the dissociation of iodine pentoxide at these higher temperatures. Below 140° C. the values drop rapidly. It is therefore much better to work in the upper temperature range than to drop below 140° C.

The iodine pentoxide method, you will note, involves two steps. The first is the procedure for liberating the iodine and absorbing it properly. The second is the titration of the iodine solution. We made about 60 carbon monoxide determinations involving the first step and over 350 iodine titrations in an effort to establish proper conditions for this titration.

We started with the Bureau of Standards directions for the titration of N/10 arsenite against N/10 iodine. We found first that with N/10 solutions variations such as the concentration of potassium iodide, differences in starches, bubbling in carbon dioxide, titrating arsenic into iodine or iodine into arsenic caused deviation of no more than 2 parts in 1,000. However, when dilute standard solutions are used these conditions become extremely important.

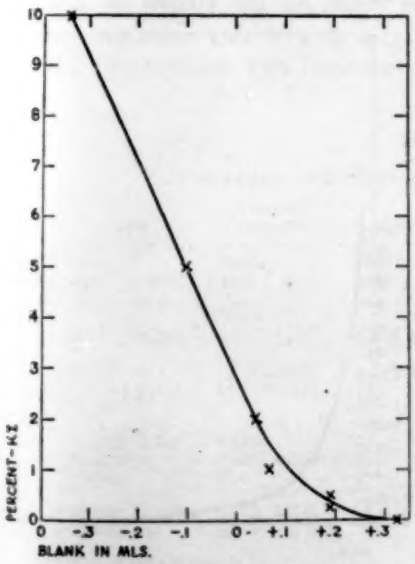

FIGURE 3

The blank for potassium iodide was determined with from zero to 10 per cent KI. Three per cent KI was found best, and gave a zero blank. This is shown in Figure 3.

When little or no potassium iodide is used the color obtained at the end point with starch solution is a clear blue. As the concentration of KI is increased this color becomes pink. It has always been considered desirable to obtain the blue color whenever possible. However, very small concentrations of iodine will not develop color with starch unless a certain amount of potassium iodide is present. In order to determine these conditions we used a starch solution which was prepared without the addition of potassium iodide. If tenth normal solutions of iodine and arsenite or thiosulfate solutions are made up and standardized, these may be diluted to thousandth normal and then titrated against one another. Varied amounts of potassium iodide were used and different amounts of iodine were taken for the titration, all the way from a fraction of 1 ml. to 50 ml. The ratio of iodine to arsenite is assumed to be the value found for the tenth normal solution. We can then determine the KI blank based on the following arbitrary conditions: (1) correction of the titer when using 15 ml. aliquots; (2) correction of the titer when using 2 ml. aliquots; (3) correction of the titer so that the ratios of iodine to arsenite using 2 ml. aliquots is equal to the ratio obtained when using 15 ml. aliquots.

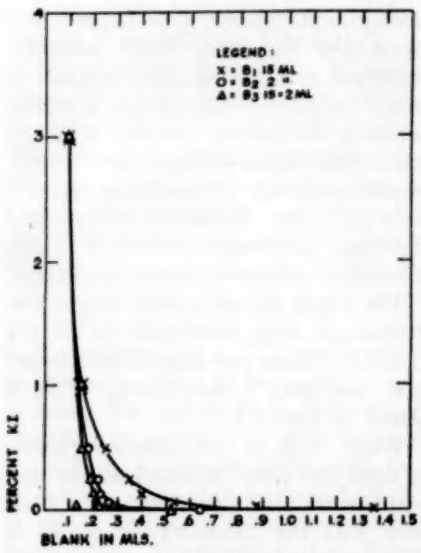

FIGURE 4

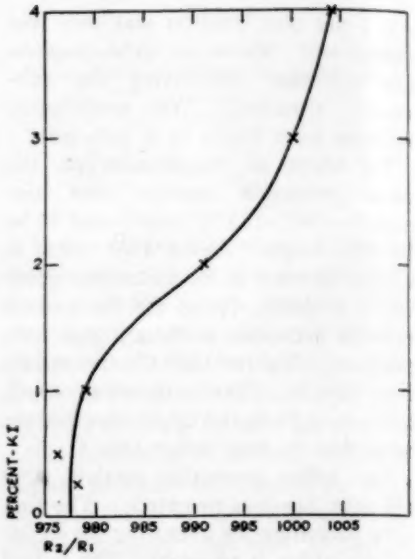

FIGURE 5

The results are plotted in Figure 4. They show that the corrections coincide and become constant when 1 per cent or more potassium iodide is used. Twenty ml. of KI solution were taken for all these titrations. To determine the titration blank, titrations should be made with various amounts of thousandth normal iodine solution at, say, 3 per cent KI, which appears to be the optimum KI concentration from other considerations already mentioned.

The true value for the concentration of iodine in the solution to be titrated is considerably affected by low concentrations of potassium iodide. This may be seen in Figure 5.

The ratio of arsenite to iodine decreases as the concentration of potassium iodide decreases. The concentration of iodine in the solution also affects the ratio of arsenite to iodine. From 0.5 to 50 ml. of N/1,000 iodine solution were used. As the amount of iodine solution is decreased the value of the ratio of arsenite to iodine increases. The correction for the KI blank increases this ratio still more, while a marked decrease in the KI lowers this ratio. Therefore there is a point (purely arbitrary) where truer values are obtained when less KI is used, but such attempts at using less KI are extremely unreliable.

Figure 6 shows that corrections must be made for the volume of titrating

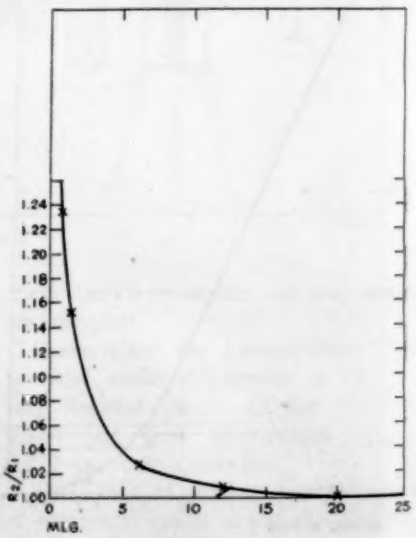

FIGURE 6

solution when less than 25 ml. of solution are used.

These findings were also confirmed when thiosulfate was used instead of arsenite.

Just a word about starch solutions. We found soluble starch satisfactory, provided that it was freshly prepared. The use of a preservative such as toluol affects the titration of dilute iodine solutions and should be avoided. When starch solutions are made up with the addition of KI, the presence of KI will, of course, affect the value of the titration blank. The effect of adding the starch at the beginning or at the end of these titrations of N/1,000 solution with different amounts of KI was studied. It was found that in the presence of 2 per cent KI, the iodine values may be slightly higher if the starch is added immediately. It is better practice to wait until a few ml. of the end point before adding the starch as is usual.

The effect of bubbling CO_2 through the solution during the arsenite titration was also investigated. In the absence of CO_2, lower values were obtained for the iodine content. It appears, therefore, that CO_2 is necessary for this titration with thousandth normal solutions and that losses due to volatilization of iodine during such procedure do not occur.

Table 2 is a summary of the results we obtained by the six methods employed. The iodine pentoxide results are regarded as the true values.

The hopcalite indicator values were obtained with the M.S.A. carbon monoxide detector. We used a number of hand driven and battery driven instruments. All canisters and cells were freshly prepared at the outset of these experiments. It is to be noted that this instrument gave very satisfactory results.

We have had considerable experience in servicing these instruments. Necessary repairs included changing canisters, refilling hopcalite cells, seeing that leads to the ammeter are not reversed, getting rid of leaks, cleaning out flowmeter fluid from connection to canister, tightening joints, recharging batteries, etc.

The Hoolamite detector gave consistently higher results at all carbon monoxide concentrations. At 0.01 per cent CO no color was obtained in twenty squeezes <0.05 per cent CO. If it is to be considered as a method at all it is only as a substitute for the canary

TABLE 2

Comparison of Methods for Determination of CO in Air

% CO Approx.	I_2O_5 Readings	I_2O_5 Ave.	Hopcalite Indicator Readings	Hopcalite Indicator Ave.	Hoolamite Readings	Hoolamite Ave.	$PdCl_2$ Readings	Ampoule Ave.	Pyrotannic Acid Readings	Pyrotannic Acid Ave.	British $PdCl_2$ Readings	British $PdCl_2$ Ave.
0.3	6*	0.277	.....	.....	2*	1.0	.....	.....	.....	.....	5*	1.0
0.3	12*	0.250	.....	.....	0.4–0.65	0.55	.....	.....	.....	.....	.....	.....
0.1	0.123 0.123 0.120	0.122	6*	0.125	0.2–0.5 12*	0.4	3*	>0.10	60–70† 6*	0.12 63†	24*	0.13
0.05	0.0550 0.0550 0.0545	0.055	0.042 0.056 8*	0.050	0.15– 0.30 7*	0.2	8*	0.09	55–65† 6*	0.11 60†	26*	0.06
0.01	0.0111 0.0107	0.0109	0.010 0.014-	0.012	.....	<0.05	0.01 0.05	0.03	10–25† 6*	0.013 17†	2*	0.01

* Number of determinations
† Per cent blood saturation

bird. It probably was not designed to do much more than that.

The palladium chloride ampoules appear to be better than the Hoolamite detector. Exposures should be timed at 10 minutes since longer exposures were found to darken the color.

The pyrotannic acid method gave a good average value at 0.01 per cent and 0.1 per cent CO. The value obtained at 0.05 per cent CO is twice as high as it should be. Two determinations were made and there were three observers for each determination. The air mixture was checked before and after with the M.S.A. CO indicator and found to be correct. The per cent saturation as read by different observers usually included three standards. This means that for concentrations where the value is very critical, say at 0.01 per cent CO the value obtained may be 100 per cent off, and constitute the difference between having a carbon monoxide hazard and not having one.

The British test paper method, which like the ampoule detector is a palladium chloride method, gave fairly good results. In the higher concentrations the values became too great. It was found that if the papers were read when wet and standing a little off at a distance, very good comparisons could be made. However, the method is a slow one and requires a considerable number of values for averaging. Reading Table 2 across, we see that at 0.3 per cent CO the iodine pentoxide method is the only reliable method to use. The other values are too high, but all read on the safe side.

At 0.1 per cent CO the hopcalite indicator gives a very good result as do also the pyrotannic and British palladium chloride methods.

At 0.05 per cent CO the hopcalite indicator is the most accurate. The British palladium chloride method also gives a good result, while the others give figures about twice as high.

At 0.01 per cent CO the hopcalite indicator, pyrotannic acid method and British method give good results. All in all, if we consider the time factor and the number of determinations, the hopcalite indicator gives by far the best performance.

Blood Lead Determinations as a Health Department Laboratory Service*

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THE Baltimore City Health Department first became interested in lead poisoning in 1929 in an investigation of several cases of industrial lead poisoning. This interest was broadened in 1932 when an outbreak of 40 non-fatal cases of lead poisoning occurred mostly in children as a result of the inhalation of fumes and dust arising from the use of discarded storage battery casings for fuel.[1] Subsequently, for a period of more than four years all cases of lead poisoning which came to the attention of the Health Department were routinely investigated in order to ascertain if possible the source of the lead exposure in both adults and children. Early in 1935, at the request of Dr. Edwards A. Park, Pediatrician-in-Chief at the Johns Hopkins Hospital, the Bureau of Laboratories provided facilities for the quantitative estimation of lead in blood in cases of suspected plumbism. These facilities were soon expanded into a routine service. The usefulness of the quantitative blood lead analysis as an index of abnormal lead absorption had already been demonstrated at that time by the extensive studies of Blumberg and Scott at the Johns Hopkins Hospital[2] as well as by other investigators.[3, 4] Subsequent investigations have further confirmed the value of this analysis in providing evidence of lead absorption in cases of suspected lead intoxication.[5-14]

Since July, 1935, we have routinely examined more than 1,400 specimens of blood from over 1,000 individuals. The blood lead service has been used by more than 20 local hospitals and by more than 80 private physicians. At the present time approximately 30 specimens of blood are examined each month. No charge is made for this work. It is the purpose of the present report to describe this unique laboratory service and to call attention to the valuable assistance which it has given to our Division of Industrial Hygiene and Bureau of Occupational Diseases in locating lead hazards and in evaluating the extent of lead poisoning in the community.

COLLECTION OF SPECIMENS

Ten gram samples of whole clotted blood are used in these examinations. In order to minimize contamination, only specimens submitted in prepared containers known as "blood lead outfits" (Figure 1) are accepted for analysis. The outfit consists of a lead-free glass test tube (17 mm. x 91 mm.) stoppered with a clean new XXXX quality Armstrong cork. The tube is first cleaned, then rinsed with nitric acid and lead-free water, and dried. The tube, together with an identification card requesting information concerning the

* Read before the Industrial Hygiene Section of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, N. J., October 15, 1941.

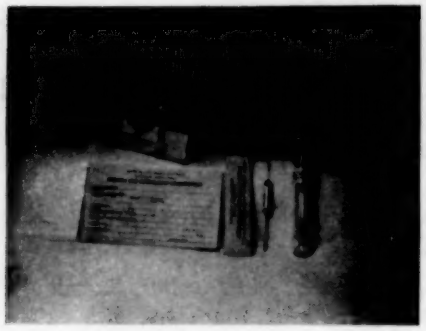

FIGURE 1

name, address, age, sex, color, occupation, and length of exposure to lead of the patient is packed in a distinctive cardboard box bearing the "blood lead outfit" label. Directions for collecting the blood specimen are printed on the reverse side of the card. Recently, the outfit was further improved by the provision of a sterile, lead-free, rustless, 19 gauge, Petroff needle (Becton Dickinson, Number 497N) contained in a small paper envelope. The needle is suitable for adult use only and eliminates the need for a syringe. The cost to us of the blood lead outfit including the needle is 7½ cents. The outfits are distributed by the Bureau of Laboratories to the local medical profession and hospitals in the same manner as outfits regularly provided for the collection of specimens in cases of infectious diseases.

METHOD OF ANALYSIS

It is now well established that traces of lead are normally present in the blood. The difference between normal and abnormal amounts of lead in circulating blood is a quantitative and not a qualitative distinction and requires the use of highly sensitive and accurate means of lead estimation. In this work the modification of the dithizone method described by Wilkins, Willoughby, *et al.*[5, 15] was used. The method was further modified to include the neutral wedge photometer in accordance with the technic of Clifford and Wichmann.[16]

Meticulous supervision is required. The method is practical only when a sufficient volume of samples is anticipated. In our laboratory, reagents and equipment are available for the simultaneous examination of 6 specimens. This equipment necessitated an outlay over a period of 4 years of more than $400. However, the average cost of a single examination is estimated at about 25 cents. The figure given does not include the cost of labor. When analyses are made in multiple, the average time required of the analyst for a single analysis is slightly more than 1 hour.

REPORTING OF RESULTS

Blood lead concentrations are reported as mg. lead per 100 gm. of blood. Recently, for convenience, the following summary of the interpretation of the blood lead value was printed on the report form which is mailed to the physician.

INTERPRETATION OF RESULTS

It is now recognized that in the general population the average lead content of the blood is about 0.03 mg. per 100 gm. In persons with no history of exposure to lead, the blood lead level may range as high as 0.05 to 0.06 mg. per 100 gm. of blood. Higher blood lead values are evidence of abnormal absorption of lead and suggest the relative severity of the recent lead exposure.

Lead absorption is not synonymous with lead poisoning. Experience has demonstrated that individuals in industrial lead exposures may have abnormal blood lead levels with no accompanying symptomatology. A high blood lead level is not, of itself, diagnostic of lead poisoning but must be correlated with other findings, both clinical and laboratory, as well as with a history of definite exposure to lead.

No direct correlation exists between the degree of elevation of the blood lead value and the severity of the symptoms. It should be further noted that in convalescence from lead poisoning the blood lead value may remain in the abnormal range for a considerable period after symptoms have disappeared.

TABLE 1

Initial Blood Lead Values in Normal Individuals and in Cases of Suspected Lead Poisoning

Mg. Lead per 100 gm. Blood	*Normal Controls*	*Suspected Lead Poisoning*			
		Positive Clinical Diagnosis		*Negative Clinical Diagnosis*	
		Adults	*Children*	*Adults*	*Children*
0.00	2	..	..	1	..
0.01	8	..	..	10	9
0.02	25	..	..	31	17
0.03	41	..	..	68	40
0.04	39	..	..	79	50
0.05	8	1	..	57	22
0.06	1	6	..	23	19
0.07	1	3	..	8	13
0.08	1	8	1	6	7
0.09	..	9	6	2	..
0.10–0.20	..	46	26	5	..
0.21–0.30	..	3	22	1	..
0.31–0.40	..	5	7	..	..
0.41–0.50	..	..	8	..	..
0.51–0.60	..	1	3	..	..
0.61–0.70	..	..	1	..	..
TOTAL (750)	126*	82	74	291	177

* Mean normal value 0.031 with standard deviation ±0.012.

If the findings in this report indicate a doubtful result or an abnormal absorption of lead, an additional specimen of blood and also a specimen of urine should be examined. Because of the time and expense involved in making these analyses, physicians must communicate directly with the Director, Bureau of Laboratories, in order to make arrangements for repeat tests.

This interpretation is based on the available literature cited in the above references as well as upon our own experience.

SUMMARY OF BLOOD LEAD FINDINGS

At the outset the laboratory service was intended merely to provide practitioners with an aid in the diagnosis of lead poisoning particularly in cases involving infants and young children. The coöperation of the hospitals and private physicians who made use of the laboratory service was solicited in order to make available the clinical histories of those individuals whose bloods had been examined for lead. This investigative work was expanded after the creation of the Bureau of Occupational Diseases in the Baltimore City Health Department in 1936. In this way, an excellent source of information was provided as to the occurrence of both industrial and nonindustrial lead poisoning in the city. In addition a study of the case histories permitted a correlation of the chemical blood lead determination with the clinical signs and symptoms, the history of exposure, and the final diagnosis made in each instance. Case histories of 624 individuals (373 adults and 251 children) have thus far been examined. A distribution of the blood lead values of this group in relation to the clinical diagnoses made is shown in Table 1.

Initial blood lead values only are recorded in this table; values obtained in convalescence or after treatment are not shown. The table also includes a series of specimens from 31 adults and 95 children (126 in all) with no history

of industrial or other exposure to lead. These specimens were obtained through the coöperation of the local infectious disease hospital. The blood lead values in this "normal" group were not significantly different for the adults and children. Since these individuals were not "normal" with respect to health, it is conceivable that metabolic disturbances associated with infectious disease may have slightly elevated the blood lead values of some members of the series.

In the group diagnosed as clinical lead poisoning our data include 82 adults, all but one of whom contracted lead poisoning in the course of their occupations; and 74 children of an average age of 2½ years, practically all of whom had a history of pica associated with the chewing of objects painted with lead containing paints. In many of the children's cases, analyses were made of paint scrapings to confirm the source of lead. Specimens from all but one of the 251 children were submitted from hospitals. On the other hand, specimens from 30 per cent of the adults were submitted by private physicians.

In plumbism, the most commonly occurring blood lead values in both adults and children was in the range of 0.1 to 0.2 mg. per 100 gm. of blood. Values in excess of 0.2 mg. occurred far more frequently in affected children than in adults.

The group tabulated as "negative clinical diagnosis" consists of individuals whose clinical histories did not show a diagnosis of lead poisoning. Many of the children in this group had a history of pica. Almost all of the adults were engaged in occupations wherein some abnormal absorption of lead might be suspected. Those adults in this category who showed blood lead values in excess of 0.07 mg. were definite examples of asymptomatic lead absorption. These men were engaged in such occupations as the manufacture of lead paint pigments, the manufacture of lead arsenate, scrap lead reclamation, and lead burning.

USEFULNESS OF THE BLOOD LEAD SERVICE AS A HEALTH DEPARTMENT METHOD

The local medical profession is accustomed to asking for a blood lead determination by the Baltimore City Health Department in cases of suspected lead poisoning encountered in their practice. A copy of the result of each analysis is forwarded to the Bureau of Occupational Diseases for investigation. In this way the majority of the actual lead hazards in local industry have been defined and numerous corrections of lead exposures were obtained.

With the reports from the blood lead service as a clue, numerous instances have occurred in the past 6 years wherein outbreaks of industrial lead poisoning were immediately called to the attention of the Bureau of Occupational Diseases and the Division of Industrial Hygiene. An excellent example which has already been cited [17] related to an incident involving several cases of lead poisoning in a manufacturing plant. A cross-connection in plumbing permitted a solution of lead compound to enter the water supply of a drinking fountain in the plant. Numerous other incidents have occurred which involve such diverse occupations as the manufacture of lead arsenate, the manufacture of lead paint pigments, acetylene torch burning in shipbreaking, enamelling with lead-containing frit and the cleaning of tanks which had been used for the storage of leaded gasoline.

In recent years, largely as a result of studies associated with a follow-up of the blood lead laboratory service, it has been possible for the Baltimore City Health Department to acquire relatively accurate information concern-

TABLE 2

Reporting of Non-fatal Lead Poisoning in Baltimore City, 1931–1940

Year	Total Non-Fatal Cases	Cases Reported		Cases Not Reported But Ascertained Through Follow-up of Laboratory Service	
		Adult	Child	Adult	Child
1931	..	..	..	..	..
1932	49	12	37	..	..
1933	2	2	..	..	..
1934	4	..	4	..	..
1935	12	1	4	4	3
1936	26	3	..	12	11
1937	24	..	..	16	8
1938	11	2	..	2	7
1939	18	..	..	11	7
1940	26	3	..	18	5
TOTAL	172	23	45	63	41

ing the incidence of lead poisoning in the community.[18] During the past 10 years, all of the known cases of fatal lead poisoning (49 children and 7 adults) were reported to the Bureau of Vital Statistics. However, there has been little tendency to report cases of non-fatal lead poisoning. This fact is strikingly demonstrated in Table 2.

The increased incidence of reported lead poisoning in 1932 is due to the storage battery outbreak mentioned earlier.[1] Beginning in 1935, it will be noted that the Health Department became aware of a large number of unreported cases of non-fatal lead poisoning. This resulted directly from the follow-up of the laboratory service. Only those cases are listed in which an investigation with regard to the history of exposure, signs, symptoms, and laboratory examination furnished evidence to substantiate the diagnosis of lead poisoning.

SUMMARY

A description has been given of a blood lead laboratory service which the Bureau of Laboratories of the Baltimore City Health Department has made available to the physicians and hospitals of Baltimore during the past 6 years. The service has proved invaluable to the Division of Industrial Hygiene and the Bureau of Occupational Diseases in locating lead hazards and in evaluating the extent of both industrial and nonindustrial lead poisoning in the community.

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The House Fly as a Vector of Food Poisoning Organisms in Food Producing Establishments*

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THE house fly *(Musca domestica)* has been incriminated as a vector of food poisoning bacteria on many occasions. Classical epidemics of food-borne infections such as the typhoid epidemics among soldiers during the Boer [1] and Spanish-American [2] wars, each of which involved more than 20,000 cases, and the widespread cases of diarrhea in Southend-on-Sea [3] in 1901 were traced to the contamination of food by flies. These and numerous other food poisoning epidemics, in which flies were thought to have been responsible for infecting food supplies, have led many investigators to study the potentialities of house flies as carriers of pathogenic bacteria. A more complete review of the literature and the results of some preliminary experimental data have been reported in a previous publication [4] in which it was shown that flies are capable of depositing on food by defecation or regurgitation countless numbers of bacteria, and further that the bacterial flora deposited is largely determined by the nature of the material on which the flies feed. Flies infected with *Salmonella enteritidis* and allowed to come in contact with sterile pecan meats deposited these pathogens in large numbers on the pecans left exposed for only 15 minutes.

Since the publication of those data several hundred flies trapped in and around crabmeat producing establishments were found to contain total bacterial counts of 750 million and as many as one million *Escherichia coli* per fly.

In the present study experiments have been conducted with flies using *Salmonella enteritidis* as the test organism to determine the ability of flies to infect other flies, the longevity of the test organism in flies, the transmission of *Salmonella enteritidis* from infected flies to mice, and the ability and extent to which uninfected flies would become vectors of the test organism when exposed to infected mice. Some studies were also carried out on the survival of *Salmonella enteritidis* during metamorphosis from eggs to adult flies.

EXPERIMENTAL WORK

The methods employed in rearing flies have been previously reported,[4] but briefly are as follows: Eggs are collected on milk- and water-soaked cotton and are suspended in physiological salt solution. This suspension of eggs is poured on the surface of a bran-alfalfa-leaf-meal medium into which is poured and kneaded a mixture

* Read at a Joint Session of the Engineering and Food and Nutrition Sections of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, N. J., October 15, 1941.

consisting of a commercial malt syrup, yeast suspension, and water. Maggots may be allowed to pupate in the top dried-out layers of this synthetic medium or in a pan of sawdust. The emerging flies are trapped in cages. For control purposes, the synthetic mash, developing maggots, and adult flies were examined for *Salmonella enteritidis*.

Since in the following experiments, with *Salmonella enteritidis* as the test organism, it was desirable to reduce surface contamination of the flies to a minimum, two methods of feeding were used. In the first of these a small cylindrical glass cup was filled to within 2 to 2.5 mm. of the top with infected food (10 ml. of an 18 hour broth culture of *Salmonella enteritidis* in equal parts of milk and water). Over this was placed a fine mesh screen. It was intended in this manner to prevent the flies from standing on or falling into the liquid food. In feeding, the fly forced its proboscis through the wire mesh. This method was not as successful as the second method in which a piece of evenly cut blotting paper was placed on a cylindrical feeding cup filled with the liquid food and this cup, full of food, then inverted over a second empty cup, the blotting paper acting as a separator (Figure 1). If the blotting paper is cut slightly smaller in diameter than the outside diameter of the cup, none of the soaked-up portion of the blotting paper is exposed to cause surface contamination of the flies when they are feeding. Drinking water is provided by covering a small bottle of water with a piece of filter or blotting paper and inverting it over a watchglass, as shown in Figure 1.

TRANSFER OF SALMONELLA ENTERITIDIS FROM FLIES TO FLIES

Using the second method, approximately 100 flies were fed for 24 hours on milk and water infected with *Salmonella enteritidis*. At the end of the 24 hour period 10 flies were trapped and anesthetized with ether. One wing of each was clipped and the flies placed in a sterile cage with approximately 100 uninfected, unmarked flies. The flies making up this population were fed fresh uninfected milk and water daily. Each day all dead flies and from 10 to 20 live unmarked flies were removed

FIGURE 1—*Feeding and Watering Flies:* Pieces of filter or blotting paper are placed between the feeding cups and between the water bottle and the watchglass.

and examined by washing for 10 minutes in a mixture of 1 per cent sodium hydroxide, 1 per cent aerozol and 5 per cent formaldehyde, followed by washing from three to five times with nutrient broth. The washed flies were then ground in a sterile mortar and the residue examined for the presence of *Salmonella enteritidis*. The nutrient broth washings, the food, water, and swabbings of the wood, wire, and glass surfaces of the cage were likewise examined. At the end of 4 days 10 unmarked flies from this first group were anesthetized, marked by clipping one wing, and placed in a sterile cage with a fresh group of 100 uninfected flies. This second group of flies was fed daily on uncontaminated milk and water. All dead flies and from 10 to 20 live unmarked flies were removed from this group daily and, as in the first group, examinations were made of surface washings and macerated flies, the food, water, and of the swabbings of the wood, wire, and glass surfaces of the cage. At the end of an additional 4 days a third population of flies was established in a similar manner, using 10 unmarked flies from the second group.

All swabbings from cage surfaces, washings from flies, and residue of ground flies were inoculated into tetrathionate broth and then streaked on bismuth sulfite agar for study. Suspicious colonies were fished and examined. All organisms were identified both biochemically and serologically. The results are shown in Table 1, where it will be noted that surface washings of flies, after chemical treatment, failed to contain *Salmonella enteritidis*. The residue from unmarked macerated flies, taken as an index of intestinal content, was found to contain the test organism in all three populations of flies, thus indicating transfer of *Salmonella enteritidis* from infected to uninfected flies in all three instances. *Salmonella enteritidis* was also recovered from the fly food, water, and cage surfaces in each of the fly populations established. These experiments were repeated twice with similar results. However, in repeating, both methods of feeding described above were used and daily transfers of known infected flies to un-

TABLE 1

Transfer of Salmonella Enteritidis in Flies

	Cage 1 —4 Days→	Cage 2 —4 Days→	Cage 3 —4 Days→	Cage 4
Examination Made of:	*Initial Population: 100 Flies, Fed Salmonella enteritidis for 24 Hours and Then Examined*	*Ten Infected Flies Transferred from Cage 1 (One Wing Clipped) to Cage 2 Containing 100 Unmarked Uninfected Flies* *	*Ten Infected Flies, Not Previously Marked, Transferred and Marked from Cage 2 to Cage 3 with 100 Unmarked Uninfected Flies* *	*Ten Infected Flies, Not Previously Marked, Transferred and Marked from Cage 3 to Cage 4 with 100 Unmarked Uninfected Flies* *
Surface washing of flies after chemical treatment	Negative	10 unmarked flies; Negative	10 unmarked flies; Negative	10 unmarked flies; Negative
Intestinal tract of flies †	Positive	Positive	Positive	Positive
Fly food	Positive	Positive	Positive	Positive
Fly water	Positive	Positive	Positive	Positive
Cage surfaces: wood—wire—glass	Positive	Positive	Positive	Positive

* Fed fresh uninfected milk and water.
† Ground up flies after chemical treatment to remove surface organisms.
Positive = *Salmonella enteritidis*.
Negative = Salmonella not isolated.

infected populations were made rather than transfers at 4 day intervals.

LONGEVITY OF SALMONELLA ENTERITIDIS IN FLIES

To determine the longevity of *Salmonella enteritidis* in flies and the period of time these test organisms would be deposited by defecation, several hundred flies were fed *Salmonella enteritidis* for 24 hours, as described in the previous experiment, after which they were placed in a sterile cage and fed sterile milk and water daily. Several pieces of orange or banana peel were also placed on the floor of the cage daily. At the end of the second day 10 flies were removed for examination, and the remainder were transferred to a sterile cage. The flies removed for study were treated chemically to remove surface organisms and then macerated and tested for presence of *Salmonella enteritidis*. The surfaces of the cage from which the flies were removed and the food and water were also examined for this organism. On the 4th, 5th, 6th, 7th, 10th, 17th, and 20th days this performance was repeated, *i.e.*, on each of these days the flies were examined for *Salmonella enteritidis* and the remaining flies transferred to a sterile cage. Following each transfer the old cage was examined for contamination with *Salmonella enteritidis*, as were the water and food it contained.

Salmonella enteritidis was isolated from the flies on each day examined except the 7th and 17th days. Sporadic recovery of the test organism from the fruit peel, fly food, and water and from cage surfaces occurred throughout the 20 days (Table 2). Although additional flies with which to continue this experiment were not available, the results of related experiments indicated that the test organism could survive for the entire duration of the life of the fly, approximately 4 weeks.

TRANSMISSION OF SALMONELLA ENTERITIDIS FROM FLIES TO MICE AND FROM MICE TO FLIES

In previous publications [5, 6] it was shown that extremely small inocula *(per os)* of the strain of *Salmonella enteritidis* used in these experiments were necessary to bring about infection and subsequent excretion of the organism in both rats and mice. It was found that approximately seven organisms fed by stomach tube to mice caused a high incidence of fatalities in 13 days or less. To determine the ability of flies to transmit *Salmonella*

TABLE 2

Longevity of Salmonella Enteritidis in Flies and the Presence of the Test Organism on Cage Surfaces

	Day Examined							
Examination Made of:	*2nd*	*4th*	*5th*	*6th*	*7th*	*10th*	*17th*	*20th*
Fruit peel	+	O	+	O	O	+	+	+
Fly food	+	O	+	O	+	+	O	+
Cage surfaces—wood—wire—glass	+	+	O	+	O	+	O	+
Surface washing of flies after chemical treatment	O	O	O	O	O	O	O	O
Intestinal tract of flies *	+	+	+	+	O	+	O	+

* Ground up flies after chemical treatment to remove surface organisms.
\+ *Salmonella enteritidis* isolated.
O Salmonella not isolated.
NOTE: Three hundred flies fed *Salmonella enteritidis* for 24 hours then placed in a sterile cage and examined on days indicated above.

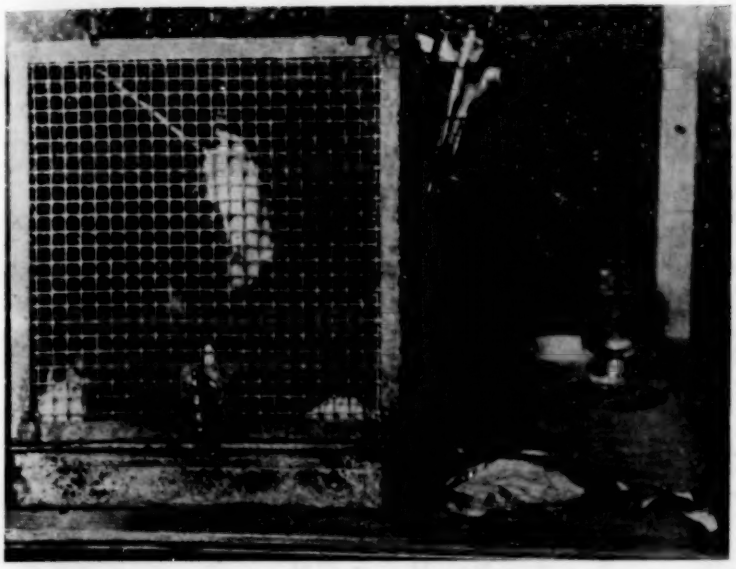

FIGURE 2—*Mice and Flies Caged Together:* The screen bottom of the mouse cage is on an open pan to allow for the collection of pellets.

enteritidis to mice or to become vectors of the organism in the presence of infected mice, the following experiments were conducted.

A one day old population of flies was fed for 24 hours on a mixture of an 18 hour broth culture of the test organism in milk and water, after which the flies were placed in a large sterile fly cage containing a small wire mouse cage in which were 6 uninfected mice (Figure 2). The mice were watered and fed daily, and the flies received fresh uncontaminated milk and water soaked up in absorbent cotton in an open Petri dish. In addition, each day the small half of a Petri dish with the open side down and several pieces of fruit peel were placed on the floor of the cage. At the end of the 4th, 12th, and 18th days all dead flies and from 5 to 14 live flies were removed for examination. The food and water of both the mice and flies, the fruit peel, the exposed Petri dish, the mouse pellets which had fallen out of the mouse cage onto the floor of the fly cage, and those pellets in the pan of the mouse cage were also examined. To avoid direct contamination by flies of exposed pellets on the floors of the cages, one or more pellets were forced from the intestinal tract of each of the 6 mice on each day examinations were made.

At the conclusion of this experiment, to determine whether transfer of *Salmonella enteritidis* from infected mice to flies was possible, the mouse cage and the feeding and watering cups were first sterilized by autoclaving. The fly cage was thoroughly washed with 5 per cent phenol, allowed to air dry, and a fresh uninfected population of flies placed in it. The sterilized mouse cage containing the 6 mice of the previous experiment, 4 of which were demonstrated to be infected with *Salmonella enteritidis*, was placed in the fly cage. At 1 week intervals for 3 weeks the food and water of both mice and flies, the fruit peel, the exposed Petri dish, and mouse pellets were examined for *Salmonella enteritidis*.

In the first of these experiments, in

TABLE 3

Transmission of Salmonella Enteritidis from Flies to Mice and from Mice to Flies

Examination Made of:	*Transmission of Salmonella Enteritidis*						
	From Flies to Mice[1]			*From Mice to Flies*[2]			
	Day Examined						
	4th	*12th*	*18th*	*7th*	*14th*	*21st*	
Fruit peel	+	+	+	+	+		
Fly food	+	+	+	+	+	O	
Fly water	O	+	+	O	+	+	
Petri dish	+	+	+	+	+	O	
Surface washing of flies[3]	O	O	O	O	O	O	
Intestinal tract of flies[4]	+	O	+	+	+	+	
Mouse water			+		+	+	
Naturally expelled mouse feces	+	+	+	O	+	+	
Forced pellets from 6 mice	4+	4+	4+	5+	4+	2+	2 Dead { 1—41st day, kidney and liver + ; 1—59th day, negative autopsy
Mouse food	+	+	O	O	+	O	

1. Three hundred infected flies placed in a sterile cage with 6 normal mice and examinations made as indicated.
2. The infected mice placed in a sterile cage with 300 uninfected flies.
3. Washings of chemically treated flies.
4. Ground up flies after chemical treatment to remove surface organisms.
+ *Salmonella enteritidis* isolated.
O Salmonella not isolated

which infected flies were caged with uninfected mice, as will be noted in Table 3, the test organism was isolated from the fruit peel, fly food, naturally expelled mouse pellets, and Petri dish on the 4th, 12th, and 18th days, while the fly water, mouse food and macerated flies after chemical treatment contained *Salmonella enteritidis* on 2 of the 3 test periods. The mouse water was examined only once and found to contain the test organism. Mouse pellets forcibly expelled were found to contain *Salmonella enteritidis* on each of the test periods from 4 of the 6 mice used.

In the second portion of these experiments, in which infected mice were caged with uninfected flies, examinations were made of the fruit peel, fly food and water, Petri dish, mouse food and water, and mouse pellets at 1 week intervals for 3 weeks. The test organism was isolated at least once from each of these materials. Macerated flies, after chemical treatment, contained *Salmonella enteritidis* at the end of the 1st week and continued to harbor the test organism for the duration of the experiment. At the end of the 1st week 5 of the 6 mice were shedding the test organism in the feces, as shown by examination of pellets forcibly expelled, whereas only 4 mice were positive for *Salmonella enteritidis* at the end of the 2nd week, and only 2 were positive at the end of the 3rd week. One of the 2 mice, shedding the test organism at the end of the 3rd week in the second half of these experiments, died on the 41st day. *Salmonella enteritidis* was isolated from the liver and kidney. Another mouse, shedding the test organism at the end of the 2nd week but not at the end of the 3rd week, died after the conclusion of this

experiment (59th day). No positive cultural tests for *Salmonella enteritidis* were obtained on autopsy.

SURVIVAL OF SALMONELLA ENTERITIDIS DURING METAMORPHOSIS OF HOUSE FLY

To determine the ability of *Salmonella enteritidis* to survive during metamorphosis of the house fly, the following experiments were conducted. Fly eggs were collected on milk- and water-soaked cotton. The eggs were removed with the aid of a penknife and suspended in physiological salt solution in order to break up the small clumps. Settled eggs were resuspended in fresh physiological salt solution and again allowed to settle. In this manner, using only settled eggs, the eggs were washed 5 times. After the final washing the eggs were resuspended in physiological salt solution and poured on the surface of the bran-alfalfa-leaf-meal medium which had previously been sterilized by autoclaving. Immediately following this, 10 ml. of an 18 hour broth culture of *Salmonella enteritidis* was poured over the surface of the mash. The battery jar of infected mash and eggs, covered with sterile cotton-covered cheesecloth, was allowed to stand until full-grown maggots had developed. Approximately 500 maggots were removed, washed with physiological salt solution several times, and then treated with sodium hydroxide, aerozol and formaldehyde, as described previously, followed by direct washing in tetrathionate broth. Approximately one-half the treated maggots were then ground in a sterile mortar and examined for the test organism, as were the washings before chemical treatment and specimens of the infected mash. The balance of the treated maggots were placed on sterile sawdust in a Petri dish to pupate, and emerging flies were trapped and examined for *Salmonella enteritidis*.

The test organism was recovered from the infected mash and from the washings of the maggots before chemical treatment. Although chemical treatment failed to sterilize the surface of the maggots, all Gram-negative forms were destroyed and *Salmonella enteritidis* was not recovered from washings of maggots following this type of treatment. The test organism was recovered, however, from the residue of ground maggots after such chemical treatment, and *Salmonella enteritidis* was isolated from the residue of ground flies, trapped as they emerged from the pupal case. The remarkable resistance of maggots to rigorous chemical treatment, wherein they were exposed to a mixture of 1 per cent sodium hydroxide, 1 per cent aerozol, and 5 per cent formaldehyde for 30 minutes, is exemplified by their ability to emerge from the pupal stage following such treatment.

DISCUSSION

The known habits of flies make them important vectors in and around food establishments of bacteria of all kinds with which these pests may come in contact. In our preliminary studies of this problem we were able to demonstrate that flies are an extremely potent source of pollution organisms, particularly in those food plants where little attention is paid to sanitation and where the food is prepared for the consumer without a final treatment to destroy these organisms.

In extending our studies to include an organism of the food poisoning type, it has been demonstrated that *Salmonella enteritidis* may be transmitted with ease and rapidity through several populations of flies, and that all surfaces with which the infected fly comes in contact become potential sources of reinfection for other insects. Our studies show that not only does the fly carry the organism on its outside

surfaces, but also in its digestive tract, since the infected, macerated insect contains large numbers of the test organism while the organism cannot be isolated from the chemically treated, washed fly. The ease of transfer of food poisoning organisms from fly to fly and the fact that such organisms survive in the fly for practically the entire life span of these insects lends added significance to their potentialities as sources of food poisoning outbreaks. In contrast to the significance of rats and mice as vectors of food poisoning organisms, house flies appear to us to be much more important in food plant sanitation.

The transfer of food poisoning bacteria by flies to mice and the subsequent retransfer from infected mice to flies, with apparent ease of transmission of infection, mark these insects as potential health hazards wherever food that is to be eaten raw is being prepared. Whereas it was found [5, 6] that the strain of *Salmonella enteritidis* used in these experiments produced a high incidence of fatalities in mice in 13 days or less, only 2 of the 6 mice infected through flies died, 1 on the 41st day and the other on the 59th day after infection. Although the strain used has been shown to be highly fatal for both rats and mice when fed by stomach tube, in the present studies the rodents survived for considerably longer periods of time. It is not possible to say whether this may be associated with a loss of virulence of this organism or from other factors. However, it is worthy of mention that in some dissociation studies not yet completed both coliform bacteria and *Salmonella enteritidis* produced a number of variants on passage through flies, and this may have some bearing on the ability of those mice infected through flies to survive infection.

The data obtained on the survival of *Salmonella enteritidis* during metamorphosis of the house fly indicate that flies breeding in infected material can give rise to infected maggots, pupae, and adults. Although the potential danger of infection of fly breeding grounds may be remote, the possibility of its occurrence would constitute a source of grave danger, particularly during the summer months when fly breeding is at its peak and climatic conditions are most favorable for bacterial development. The removal of waste and refuse from the vicinity of food producing plants, adequate protection by screening to prevent fly contact with food, and the elimination of flies from such establishments are essential in plant sanitation.

SUMMARY—CONCLUSIONS

Flies fed on food infected with *Salmonella enteritidis* are capable of infecting other flies as well as the food, water, and miscellaneous surfaces with which they come into contact.

Salmonella enteritidis apparently survives in the fly for the duration of the life of the fly, approximately 4 weeks.

Transfer of *Salmonella enteritidis* infection from infected flies to mice and the retransfer of infection from infected mice to flies was successfuly carried out.

Fly eggs planted in mash infected with *Salmonella enteritidis* resulted in infected maggots, pupae, and adults.

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Training of Medical Personnel in Syphilis Control*

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DURING the latter half of 1937 a 4 weeks' postgraduate course in syphilis control was organized in the Vanderbilt University School of Medicine. The syphilis clinic was organized as a special clinic in the Department of Medicine during 1926, and was for a number of years concerned only with the instruction of undergraduate students. The expansion of the clinic activities for postgraduate instruction was made possible by funds allotted by the U. S. Public Health Service. The first course was given in January, 1938, and was repeated 6 times each year prior to July 1, 1941.

The need for postgraduate training was the outcome of rapid expansion of the syphilis control program and lack of prepared personnel to direct the various activities which were being organized in the respective states. The increase in number of syphilis clinics in the United States during the past ten years is shown in Table 1. In 1935 there were 656 clinics reporting from the various states. By 1940 the number was over three times as great. This rapid expansion was made possible by funds made available to the individual states from appropriations for venereal disease control after passage of the Social Security Act in 1935 and the Venereal Disease Control Act in 1938.

The course in syphilis control was planned especially for the training of county health officers, private physicians coöperating with local health departments and public health nurses. The chief objectives were to provide an opportunity for a period of intensive instruction in diagnostic and therapeutic procedures, epidemiology, and the broader public health aspects of syphilis control. The advisability of having a 4 week period of instruction was questioned when the course was first organized. It seemed advisable, therefore, to evaluate the 3½ years' experience with the short intensive course of instruction.

CLINICAL ORGANIZATION AND OUTLINE OF COURSE

A detailed description of the organization of the course was published by Kampmeier and Clark in 1939. The syphilis clinic is attended each week by about 350 patients, both white and colored, in four clinic sessions, one of which is a night clinic. The organization of the clinic is shown in Diagram 1.

The clinic staff is made up of 3 full-time members of the Department of Medicine, a visiting dermatologist, 2 full-time members of the Department of Preventive Medicine and Public Health, and 2 social workers especially trained

* From the Department of Preventive Medicine and Public Health and the Department of Medicine aided by funds allotted by the United States Public Health Service.

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TABLE 1

*Report of Coöperative Clinic Activities Furnished through State Health Departments from 1930–1940**

Year	Number of Clinics Reporting	New Cases Admitted	Increase in Number of Clinics Reporting
1930	477	127,978	...
1931	512	143,982	35
1932	533	150,906	21
1933	572	154,302	39
1934	616	129,293	44
1935	656	134,720	40
1936	713	126,271	57
1937	965	149,472	252
1938	1,122	197,303	157
1939	2,085	314,594	963
1940	2,454	355,589	369

* Data taken from Table IV, page 148, modified to show increase in number of clinics per year, of 1940 *Annual Report*—Surgeon General of the Public Health Service of the United States.

in contact investigation and follow-up of patients under treatment.

SCHEDULE OF HOURS AND SUBJECT MATTER

The distribution of the 160 scheduled hours for the course, according to subject matter, is shown in Table 2.

The clinic sessions of which there are four take up a total of 44 hours. Each student spends the first 2 hours in the clinic with a member of the staff and individual cases already under treatment are seen. Problems in the management of each patient are discussed. The students also have an opportunity to discuss these patients with reference to epidemiology and follow-up based on field experience. Education of patients and methods of obtaining names of contacts are demonstrated. During the last hour of each clinic session new patients are presented to the entire student group. The history of each patient is reviewed, the diagnosis discussed, and darkfield technic demonstrated. In this way every new patient admitted to the clinic is seen by the

TABLE 2

Schedule of Hours of Instruction in Syphilis Control Work for Postgraduate Students

Subject Matter	Hours
Clinics	44
Individual instruction and special activity in which trainee is especially interested	28
Lectures	22
Library assignments—Reading	15
Epidemiology—Seminars	12
Reports and discussion of assigned readings—Seminars	12
Assigned contact investigation without assistance	10
Field investigation with epidemiologist and social workers	
1. Contact investigation	
2. Follow-up	9
Pediatrics—Congenital syphilis	4
Record keeping and clinic operation	4
Total Hours	160

POSTGRADUATE INSTRUCTION IN SYPHILIS CLINIC

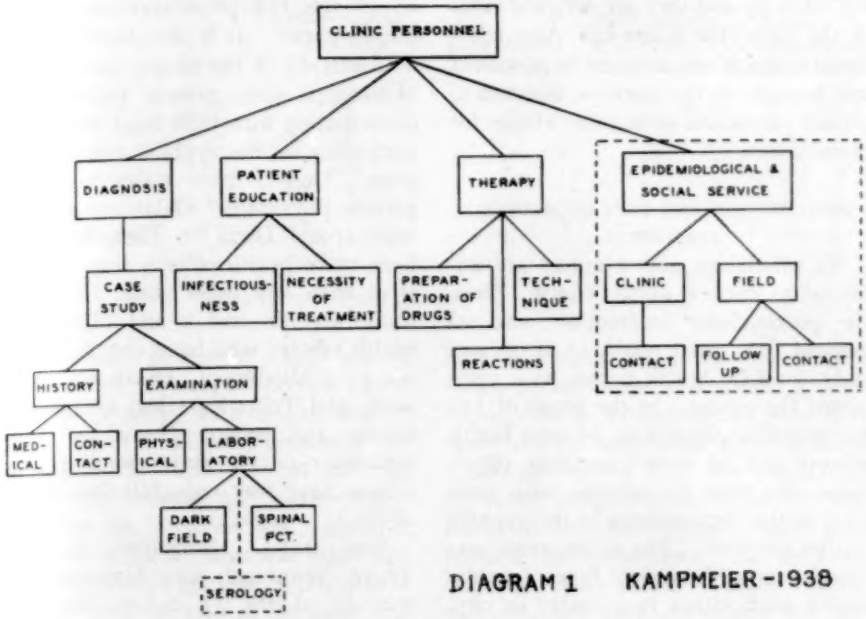

DIAGRAM 1 KAMPMEIER-1938

entire group and all phases of management of these patients are observed.

About one-third of the time is assigned to group instruction in the form of lectures and seminars. Lectures are given on the clinical and epidemiologic aspects of syphilis. These are supplemented by assigned readings in the library. These readings are discussed in seminars conducted by a member of the full-time staff. During the first 2 weeks the procedures used in obtaining names of contacts and methods employed in the field are discussed. During this 2 week period each student is required to make field trips with the epidemiologist and social worker to visit contacts and learn methods of approach in getting contacts to come in for examination. During the last 2 weeks each student is assigned two or more contacts of acute or early cases of syphilis which he must visit and get in for examination without assistance.

Congenital syphilis is discussed by a member of the full-time pediatric staff in the syphilis clinic conducted in the outpatient pediatric service.

The students are also given opportunity to spend some time on various phases of epidemiology or clinical syphilis in which they may be especially interested. In some instances trainees have conducted special clinical studies, as well as participating in the clinic, for a period of 3 or more months.

Postgraduate nurses attend the lectures and seminars, and are given the same course of instruction except that they spend their time in the clinic with the social workers. They attend patient demonstrations at the close of each clinic session, when new cases are presented and discussed. At the close of the 4 weeks' session they are assigned to the

social workers for another 4 weeks' period of field training. Social problems are taken up and they are assigned cases in the clinic for follow-up. Also additional contacts are assigned to be visited and brought to the clinic or directed to private physicians or to other clinics for examination.

DISTRIBUTION AND TYPE OF MEDICAL PERSONNEL

Six physicians and 2 nurses are admitted to each 4 weeks' course. Since the postgraduate instruction was organized (3½ years ago) 115 physicians and 33 public health nurses have completed the course. In the group of 115 postgraduate physicians, 54 were health officers and 61 were practising physicians who were coöperating with their local health departments in the syphilis control program. The nurses were previously engaged in some type of public health work, either in a county or city, or as supervisors in the state or county public health nursing program.

A geographic distribution of trainees is shown in Table 3.

The physicians and nurses have come from 11 states for postgraduate instruction in syphilis control. Kansas has furnished 2 nurses; California, Oklahoma, and Virginia have each sent only physicians. Mississippi has furnished 68 of the 115 physicians and 10 of the 33 nurses. It is also interesting to note that 53 of the 68 physicians from Mississippi were private practitioners participating with their local health departments in the syphilis control program. Only 3 other states have sent private physicians: Oklahoma 4, Missouri 3, and Texas 1. There have also been more health officers from Mississippi than any other state, 15 in all. California has had 9 and Missouri 8 health officers who have completed the course. Mississippi, Oklahoma, Missouri, and Texas have had both health officers and private physicians. The remainder of the states sending physicians have sent only full-time health officers.

Five states, Mississippi, Missouri, Texas, Tennessee, and Alabama have sent 27 of the 33 nurses who have completed the full 8 week course of training.

INFORMATION OBTAINED BY QUESTIONNAIRE

In order to get some evaluation of the short but intensive period of training, questionnaires were mailed to all

TABLE 3

Geographic Distribution of Postgraduate Physicians and Nurses Over 3½ Year Period

State	*Health Officer*	*Private Physicians*	*Total Physicians*	*Nurses*	*Total Postgraduates*
Mississippi	15	53	68	10	78
Texas	8	1	9	4	13
Missouri	4	3	7	5	12
Tennessee	6	..	6	4	10
California	9	..	9	..	9
Oklahoma	5	4	9	..	9
Alabama	2	..	2	4	6
Louisiana	3	..	3	2	5
Arkansas	1	..	1	2	3
Kansas	..	..	..	2	2
Virginia	1	..	1	..	1
Total	54	61	115	33	148

TABLE 4

Type of Teaching Material and Methods Preferred by Physicians Answering Questionnaire

Rating	*Lectures*	*Observations with Staff in Clinic*	*Case Demonstrations*	*Epidemiology Contact Tracing*	*Reading Assignments and Reports thereon*
1	41	14	11	1	1
2	10	16	31	4	0
3	12	16	16	8	12
4	1	8	3	17	22
5	..	4	3	24	21
Not Answered	6	12	6	16	14
Total	70	70	70	70	70

postgraduate physicians and nurses. Forty health officers, 30 private physicians coöperating with health departments, and 22 nurses answered the questionnaire. Table 4 shows the type of teaching material and methods preferred by the 70 physicians. Material presented in the lectures was rated first by the highest percentage of physicians. Working with the staff in the clinic and case demonstrations at the end of each clinic period were also given a high rating. It is interesting to note that epidemiology was rated first by only 1 and second by 4 of the physicians. In many instances the statement was made in the questionnaire that they realized that epidemiology was the most important part of the syphilis control program, yet they personally did not

TABLE 5

Information Obtained from 70 Physicians Concerning Procedures Used in the Management of Patients with Syphilis

	Health Officers (40)	*Private Physicians (30)*
1. Method of Treatment		
No Change	24	6
Slight Change	10	5
Radical Change	4	15
Not Answered	2	4
2. Spinal Fluid Examinations		
Doing Spinal Punctures	29	12
Having Spinal Punctures Done	5	15
Rarely Do Spinal Punctures	1	..
Not Doing Spinal Punctures	5	3
3. Darkfield Examinations		
Darkfields Done	31	5
Darkfields Done by Others	5	19
Darkfields Not Done	4	5
Not Answered	..	1
4. Getting Names of Contacts		
Gets Names Personally	35	23
Nurse Gets Names	4	6
Not Getting Names	1	1

like to do contact investigation or follow-up work.

Table 5 gives some general points with reference to management of patients with syphilis. It is noted that 50 per cent of the private physicians stated that they had made radical changes in their method of treatment. A high percentage of both health officers and private physicians were either doing or having darkfield examinations done and spinal fluids examined. It is also encouraging to find that only 1 health officer and 1 private physician were not getting names of contacts of acute cases. The health officer stated that this was not being done because of lack of clinic personnel.

CLINIC ACTIVITIES OF HEALTH OFFICERS AND PRIVATE PHYSICIANS

Table 6 shows the number of clinics the 39 health officers conducted or had under their direct supervision each week. These figures show an average of 5 clinics per week. In the 196 syphilis clinics conducted by health officers the average number of patients treated per week was 20,000. Two of the health officers stated that they were operating clinics in which 2,000 patients were treated per week. Information as to the number of physicians participating in the 196 clinics per week was not obtained.

Table 7 shows that the private physicians participating in the clinics under health department supervision assist in one or two clinics and spend an average of from 3 to 4 hours each week in the clinics. Each of these private physicians treats an average of approximately 100 patients per week.

It was also significant that practising physicians answering the questionnaire stated that they were assisting in every way possible to stimulate interest in venereal disease control in their particular locality and among the members of the medical profession. Many stated that they were getting names of contacts from private patients and that these names were turned over to the health department for investigation.

TABLE 6

Syphilis Clinics Conducted by Health Officers

Number of Health Officers	39*
Total Number of Clinics Per Week	196
Average Number of Patients Treated Per Week	20,000

* One Health Officer who had been called into the Army failed to answer this part of questionnaire.

TABLE 7

Activities of Private Physicians Participating in Treatment Clinics under Health Department Supervision

Total Number of Private Physicians	26
Average Number of Clinics Per Week	1–2
Approximate Number of Hours Spent in Clinics Per Week	3–4
Average Number of Patients Treated Per Week	2,550

ACTIVITIES OF THE PUBLIC HEALTH NURSES

Twenty-two of the 33 nurses who had completed the course answered the questionnaire. Seven of the 22 were spending full time on venereal disease control although 1 had recently been transferred to routine public health duty in her county. Two of these full-time nurses were located in large cities. Of the remaining 15, 7 were routine public health nurses having charge of one or more districts in a county; these were also assisting in the clinics in contact investigation and follow-up of patients under treatment. Six of the nurses stated that they were acting as supervisors for large districts in the state nursing program. One nurse had married and another died a few months after completing the course of instruction. In all, 20 were actively engaged in some phase of the venereal disease control program.

INFORMATION OBTAINED BY FIELD VISITS

The field visits were made by two members of the teaching staff. This was done to obtain firsthand information relative to the value of the 4 weeks' course, with special reference to clinic management and application of epidemiological methods in the different clinics. An effort was also made to see how the private physicians were functioning in coöperation with local health units in the syphilis control program. Sixteen physicians and 5 nurses were visited in 3 states, Missouri, Arkansas, and Mississippi.

The physicians taking courses in syphilis control have returned usually to small communities, though a number entered upon full-time venereal disease control work in larger centers of population. The latter usually devoted 3 or more months to training in our clinic.

One of the most valuable achievements noted was the better coöperation of the private physicians with official health agencies as a result of their broader concept of the syphilis problem. Many of the county health officers pointed out that practitioners who had formerly been disinterested or who had actually opposed the work had acquired a changed viewpoint and were giving wholehearted support to the syphilis control program. This change in attitude was also observed by the public health nurses who were interviewed. As an example, may be mentioned the private physician who, out of his own funds, had constructed a building to house a syphilis clinic in his community. Another private practitioner organized a campaign to obtain an appropriation from the city council of a small country town for a community health center. He was successful in his effort and was very proud of this accomplishment. It was learned from the health officer that this physician had not been particularly interested in public health before taking the postgraduate course.

Observations made in the clinics conducted by health officers confirmed the information obtained from the questionnaires with regard to the use of more modern diagnostic and epidemiological procedures.

Upon the public health nurse falls most of the burden of contact investigation. These field visits indicated that the nurse who had completed the course was able to carry on this work more efficiently and was also instrumental in stimulating the physicians to get names of contacts of acute cases. These public health nurses were also training other nurses in the local health units in the principles of syphilis control.

SUMMARY AND CONCLUSIONS

The manner in which the short intensive course of instruction in syphilis control has influenced the postgraduate physicians and nurses has been reviewed. The course has been given to 115 physicians and 33 public health nurses from 11 states. The private physicians and the health officers have adopted more modern methods for diagnosis and treatment. Procedures such as darkfield and spinal fluid examinations are being used by physicians who, before taking the course, had not made use of these diagnostic aids.

The attitude of the private physicians toward the syphilis control program has been markedly improved and there has been better coöperation with health agencies in all phases of the syphilis control program.

The administration of syphilis control measures by the local health officers has improved as a result of better understanding of the syphilis problem. Contact investigation, which had been neglected, is now a routine public health procedure. Public health nurses who have taken the course have been particularly helpful in this phase of the

work and have trained other nurses in the local health departments.

In general, our 3½ years' experience in training personnel in syphilis control has led us to believe that much can be accomplished with the short intensive course of instruction.

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U. S. Quinine Supply

THE Reconstruction Finance Corporation recently announced that 500,000 ounces of the 2 million ounces of quinine that it had purchased on the recommendation of the War Production Board had been lost at sea. The Netherlands Indies which has supplied the world with 90 per cent of its cinchona bark and derivatives now being cut off, it becomes a problem to know how the annual consumption of the United States of 3½ million ounces of quinine can be supplied. It was expected that the trade and private consumers had between one and two years' supply on the shelf.

The Federal Loan Administration announced that the Defense Supplies Corporation had purchased 1½ million ounces and had agreed to purchase cinchona bark equivalent to more than 3 million ounces, arranging for its immediate shipment to Australia for transshipment to the United States. This is expected to supplement the supplies obtainable from Peru, Bolivia, Brazil, Venezuela, Colombia, and Guatemala. The United States Government and private American drug interests have fostered experimental work recently in South America looking toward the production of types of cinchona yielding higher amounts of quinine.

Announcement was also made that substantial progress had been achieved in the manufacture of true synthetic quinine through the U. S. Public Health Service. Unlimited quantities of atabrine can be produced in the United States and it was expected that there was little likelihood of shortages in quinine itself for its essential purposes.

Human Equine Encephalomyelitis and St. Louis Encephalitis in California, 1939-1941*

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IN previous reports [1, 2] it had been demonstrated by means of the serum neutralization tests and by recovery of the active agent itself, that the virus of western equine encephalomyelitis has been responsible for human cases of the disease in California for some time past. Antibodies against the St. Louis encephalitis have likewise been found among the population in similar geographical areas of the two central valleys of the state. Because the equine type of encephalitis has now become recognized as a clinical entity in man, the earlier study has been continued and a summary of the findings from 1939 through October, 1941, is herewith presented. Subsequent to the earlier articles, Davis,[3] Cope and Maytum,[4] and van Wagenen [5] have published on the clinical aspects of the disease, and Buss and Howitt [6] have presented a detailed study of human equine encephalomyelitis as seen in Kern County, Calif. Because the test for neutralizing antibodies has proved an aid in the differentiation of neurotropic virus diseases, the physicians are now better able to evaluate the etiology of their cases, separating those with mild encephalitis from those having non-paralytic poliomyelitis, where formerly many were reported as the latter disease.

NEUTRALIZATION TESTS

The serum neutralization test as used in this study was employed essentially in the same manner as previously described,[2] except that rabbit serum was added to the broth diluent rather than distilled water. Two dilutions of each virus were made from a 10 per cent mouse brain suspension in Ringer's solution. The weaker dilution was about 10 times, and the stronger 50 times the least amount of virus that killed 50 per cent of the mice upon titration. The serum and virus dilutions were added in equal parts, left overnight in the refrigerator, and inoculated intracerebrally into young white mice. A serum was considered positive if it neutralized both dilutions of virus, and weakly positive if it only protected against the higher dilution. Because of the many tests performed with the same technic over a long period of time, and because they were repeated on the weakly positive sera, no differentiation has been made in computing the final results. All tests showing some degree of protection have been included as positive in the tables.

Protection tests were run routinely against the St. Louis virus of encepha-

* Aided by a grant from The National Foundation for Infantile Paralysis Incorporated.

litis (originally obtained through the courtesy of Dr. W. T. Webster of the Rockefeller Institute) and the virus of western equine encephalomyelitis, Br. strain of human origin.[1]

Table 1 gives the comparative results of the test for the years 1939, 1940, and 1941. Sera were received not only from the two central valleys of the state but a large number from the Bay Region and adjacent coastal towns. They were all from individuals having disturbances of the central nervous system, including poliomyelitis. The sera containing antibodies for the encephalitic viruses were from residents of either the Sacramento or the San Joaquin Valley, only one being positive for the St. Louis strain in the Bay Region. However, in 1941, two sera from the coastal counties of Santa Cruz and San Mateo, south of San Francisco, were found to neutralize the St. Louis virus. Both were from adults showing neurotropic disturbances and were without contact with the inland valleys. Another serum positive for this virus was also obtained from Sonoma County north of the Bay Region. The only other protective sera have been from 6 children referred to San Francisco hospitals from the valley districts. They were all positive to the western equine strain.

The percentage of positive tests for the equine virus has fluctuated each year for the different regions as shown in Chart 1. There was an increase for Kern County during 1939 and 1940, dropping in 1941, while in Fresno County there has been a steady increase for each year. It may be of significance that more sera were positive only to the St. Louis strain from Tulare County than from the other endemic areas. The other valley counties reported many cases of encephalitis for 1940 but very few for 1941. In fact, the total number for these regions fell markedly during

TABLE 1

Results of Serum Neutralization Tests on Cases Showing Neurotropic Symptoms *

County	Positive or Negative to Virus	Number Tested	1939	Number Tested	1940	Number Tested	1941
Kern	W. equine	111	47 (42.3%)†	60	42 (70.0%)†	50	15 (30.0%)†
	W. equine alone		35 (31.5%)†	39	26 (66.6%)†		9 (18.0%)†
	St. Louis alone		5 (4.5%)†	39	0		8 (16.0%)†
	Equine and St. Louis		12 (10.8%)†	39	10 (25.6%)†		6 (12.0%)†
	Neg. to equine and St. Louis		59 (53.6%)0	60	18 (30.0%)0		27 (54.0%)0
Fresno	W. equine	42	9 (21.4%)†	25	14 (56.0%)†	36	23 (63.8%)†
	W. equine alone		8 (19.0%)†		11 (44.0%)†		12 (33.3%)†
	St. Louis alone		5 (12.1%)†		3 (12.0%)†		5 (13.8%)†
	Equine and St. Louis		1 (23.8%)†		3 (12.0%)†		11 (30.5%)†
	Neg. to equine and St. Louis		28 (66.6%)0		8 (32.0%)0		8 (22.0%)0
Tulare	W. equine	15	6 (40.0%)†	12	3 (25.0%)†	15	2 (13.3%)†
	W. equine alone		4 (26.6%)†		1 (8.3%)†		1 (6.6%)†
	St. Louis alone		2 (13.3%)†		5 (41.6%)†		8 (53.3%)†
	Equine and St. Louis		2 (13.3%)†		2 (16.5%)†		1 (6.6%)†
	Neg. to equine and St. Louis		7 (46.6%)0		4 (33.3%)0		5 (38.3%)0
Other Valley Counties	W. equine	40	13 (32.5%)†	64	31 (48.4%)†	29	8 (27.8%)†
	W. equine alone		11 (27.5%)†		23 (35.9%)†		3 (10.3%)†
	St. Louis alone		3 (7.5%)†		7 (18.9%)†		4 (13.7%)†
	Equine and St. Louis		2 (5.0%)†		8 (12.5%)†		4 (13.7%)†
	Neg. to equine and St. Louis		24 (60.0%)0		26 (40.6%)0		16 (55.1%)0
Bay Region	W. equine	54	0	50	0	40	0
	W. equine alone		0		0		0
	St. Louis alone		0		1 (2%)‡		0
	Equine and St. Louis		0		0		0
	Neg. to equine and St. Louis		54 (100%)0		49 (98.0%)0		40 (100%)0

† Sera neutralized the virus
0 Sera did not neutralize the virus
‡ Weakly positive

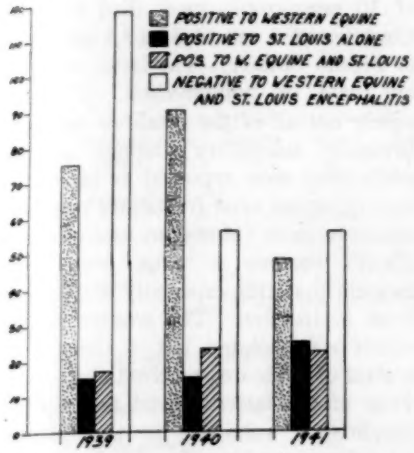


CHART 1—Comparative Incidence of Western Equine and St. Louis Encephalitis in the Central Valleys of California for 1939, 1940, and 1941 as Determined by the Serum Neutralization Tests

this year. While the figures given in the table are based on the number of sera received or on autopsy material, yet undoubtedly they do not represent all of the cases, because the blood was taken mainly from patients coming to the county hospitals, and many were probably missed.

During 1939, the number of tests that were negative to the encephalitic viruses increased for Fresno County with a corresponding decrease in those positive to the equine or the St. Louis strains. Because many cases were diagnosed as poliomyelitis and the latter virus was isolated three times from fatal cases in Fresno in 1939, it seems probable that the negative sera were mainly from poliomyelitic patients. Kern County likewise reported as many as 73 (63.7 per cent) cases of poliomyelitis during the same year.[6] In 1940, encephalitis again increased in the same areas while poliomyelitis declined.

In 1941, all types of neurotropic virus diseases had decreased. The reduction was especially noticeable for the more northerly counties in the Sacramento Valley. Only 11 sera were received, by contrast with 33 in 1940. Twenty-one (63.6 per cent) of the latter had been positive for the western equine virus, while only 5 (15.1 per cent) reacted with the St. Louis strain. Three were positive for both viruses. The decrease in encephalitis for 1941 may be interpreted as due to a change in climatic conditions, because the rains were heavy and unusually prolonged during the early months of the year and thus unfavorable for the early appearance of an insect vector.

In Table 2 are given the complete data of the neutralization tests on sera from the two central valleys for 1939, 1940, and 1941, supplemented by the records for 1937 and 1938. The total numbers represent all the cases diagnosed as some form of neurotropic virus disease, including those of poliomyelitis. Except for 1940 the percentages have remained about the same for the sera positive against the western equine virus.

TABLE 2

Total Neutralization Tests on Valley Sera against Western Equine and St. Louis Viruses

	Number Tested 1937–38		*Number Tested 1939*		*Number Tested 1940*		*Number Tested 1941*	
Total W. equine	86	32 (37.0%)†	208	75 (36.0%)†	161	90 (55.9%)†	130	48 (36.9%)†
W. equine alone				58 (27.8%)†		57 (35.4%)†		25 (19.2%)†
St. Louis alone				15 (7.2%)†		15 (10.7%)†		25 (19.2%)†
St. Louis and equine	69	18 (26%)†		17 (8.1%)†		23 (16.4%)†		22 (16.9%)†
Total St. Louis	103	49 (47.5%)†		32 (15.3%)†		38 (27.1%)†		46 (35.3%)†
Negative to W. equine and St. Louis				118 (56.7%)0		56 (40.0%)0		56 (43.0%)0

† Sera neutralized the virus
0 Sera did not neutralize the virus

RECOVERY OF THE VIRUS AND MORTALITY RATES

While the differentiation of neurotropic virus diseases in California has been based largely on the results of the neutralization tests, yet findings on human autopsy material have also been available. Recovery of the viruses of both poliomyelitis and of western equine encephalomyelitis has given evidence of their presence in these localities. Previous reports have described the isolation of the latter strain from 2 human cases in 1939 [2] and later from 2 others in 1940.[6] Another human strain has been recovered in 1941 from a 9 year old boy in the Fresno General Hospital.

During 1939 the virus of poliomyelitis was obtained from 3 out of 5 fatal cases diagnosed as bulbar poliomyelitis in Fresno County and again from one in 1940. It was also isolated from the feces of 6 individuals in Kern County in 1941. It is evident therefore that this virus is endemic in these areas and that the neurotropic diseases, poliomyelitis, western equine and St. Louis encephalitis, may at times be confused, particularly the abortive or non-paralytic forms or even certain types of paralysis.

In 1937 when epidemic encephalitis first became a problem in California, there were 40 deaths out of 102 cases reported to the State Department of Public Health or a mortality of 39.1 per cent.[7] Twenty-eight of these patients were in Fresno County with 13 deaths or 42.8 per cent fatality. In 1940 the deaths had fallen considerably in the lower part of the central valleys according to the report of Dr. H. L. Wynns of the State Department of Health.[8] The rate was 18.6 per cent of 43 cases in Fresno County and 15.2 per cent of 46 cases in Kern County. On the other hand, the fatalities in the more northerly districts varied from 20 to 25 per cent.

In 1941 the death rate was lower in the valleys. Two (4 per cent) out of 50 neurotropic cases died in Kern County and 3 out of 35 (8.5 per cent) in Fresno County. The latter included one case of poliomyelitis. Unfortunately not all of the fatalities had confirmatory laboratory findings, so that while they were reported as encephalitis, the actual type frequently remained undetermined. However, one may not always recover a virus from postmortem material, especially if it is sent from a distance. The western equine strain was isolated but 4 times from a total of 34 brains received since 1937. Four of the latter proved to be poliomyelitis, 3 were due to the tubercle organism, one to *Torula histolytica*, one to rabies, and one to *Staphylococcus aureus*. Two of the remaining cases were diagnosed as bulbar poliomyelitis but the others were probably due to encephalitis most likely of the equine type.

AGE AND SEX DISTRIBUTION

Tables 3 and 4 show the age and sex distribution of the cases having antibodies against the equine and the St. Louis viruses for the years, 1939, 1940, and 1941. It is significant that more males than females are affected. This holds true for each year and for both types of viruses. Over twice as many males as females, or 176:82, showed antibodies for the 2 encephalitic strains.

When the data for the 3 years are combined and the ages are subdivided as in Table 4, the male cases still predominate for both viruses. The differences in sex are less noticeable among the younger children through the 12th year, when apparently the chances of exposure to an insect vector are more evenly distributed. On the other hand, owing to the more exposed outdoor life of the men in these agricultural regions, males over 13 years of age seemed to run a greater risk of becoming infected than females. This is also true for the

TABLE 3

Age and Sex Incidence for Encephalitic Cases in Valley Areas

Year	Positive to Virus	Total Number	Sex		Total Number Cases Tested	Age Incidence According to Positive Neutralization Tests			
			Male	Female		Under 1 Year	1–9 Years	10–19 Years	20 Years and Over
1939	W. equine	83	51 (61.4%)	18 (21.6%)	82	8 (9.7%)	23 (28.0%)	20 (24.3%)	17 (20.7%)
	St. Louis alone		9 (10.8%)	5 (6.0%)		1 (1.2%)	2 (2.4%)	6 (6.0%)	5 (6.0%)
	W. equine and St. Louis		16 (19.2%)	2 (2.4%)		1 (1.2%)	5 (6.0%)	4 (4.8%)	4 (4.8%)
1940	W. equine	105	61 (58.0%)	29 (27.6%)	102	19 (18.6%)	24 (23.5%)	14 (13.7%)	30 (29.4%)
	St. Louis alone		9 (8.5%)	6 (5.7%)			2 (1.9%)	6 (5.8%)	7 (6.8%)
	W. equine and St. Louis		15 (14.2%)	8 (7.6%)		3 (2.9%)	5 (4.9%)	7 (6.8%)	8 (7.8%)
1941	W. equine	70	28 (40%)	19 (27.1%)	69	7 (10.1%)	10 (11.5%)	12 (17.3%)	14 (20.2%)
	St. Louis alone		20 (28.5%)	5 (7.1%)			7 (10.2%)	9 (13.0%)	10 (11.5%)
	W. equine and St. Louis		14 (20.0%)	9 (12.8%)		1 (1.4%)	2 (2.9%)	9 (13.0%)	6 (8.7%)

similar age periods in regard to exposure to the St. Louis virus.

All ages are affected by the western equine virus, varying from 16 days to 74 years, with the largest proportion in the group 0–10 years. There are also many cases among males 10 to 30 years old. In Kern County alone, for 1938, 1939, and 1940 [6] the largest number of equine encephalomyelitic cases were under 10 years of age with many among infants under 1 year.

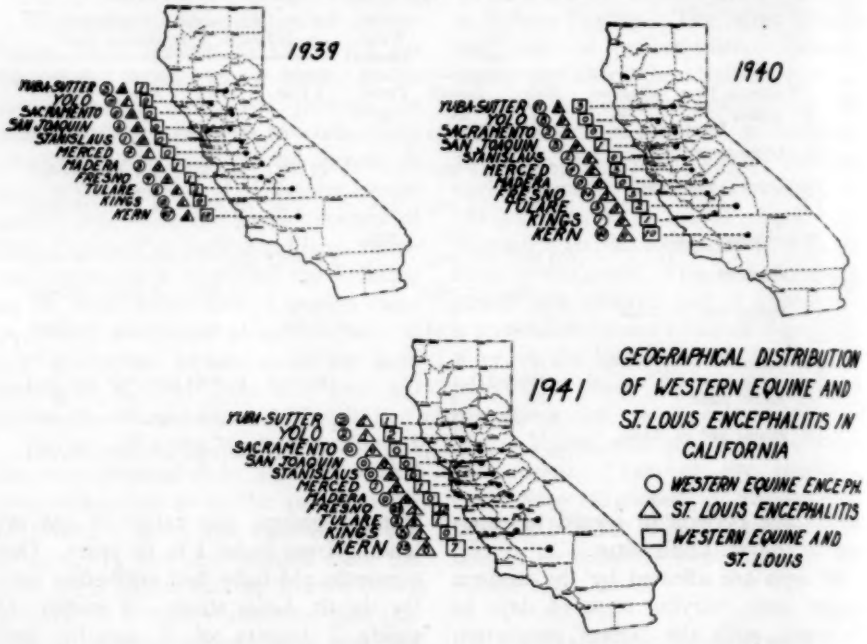
In California the ages most affected by St. Louis virus seem to lie between 13 and 30, with few cases among the younger groups, the range in age extending from under 1 to 66 years. One 6 months old baby had antibodies only for the St. Louis strain. A month old child, 5 infants of 2 months, and another infant of 3 months were positive for both the St. Louis and the equine viruses. The serum of a 20 day old baby with encephalitis showed weak neutralizing ability when first tested for the St. Louis strain but was negative 2 weeks later. The mother had strong antibodies against this virus and it seems probable that the child had acquired them through placental trans-

TABLE 4

Encephalitic Cases in the Central Valleys by Age and by Sex. Neutralization Tests Positive for the Virus for 1939, 1940, 1941

Age Groups	Western Equine			St. Louis Alone			Western Equine and St. Louis		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0–1	24	16	40	2	0	2	5	2	7
2–6	18	18	36	2	4	6	3	4	7
7–12	18	16	34	3	3	6	6	6	12
13–19	26	6	32	10	6	16	11	4	15
20–29	20	4	24	10	2	12	7	2	9
30–39	14	1	15	3	1	4	3	0	3
40–49	5	2	7	4	0	4	3	1	4
50–59	9	2	11	2	0	2	5	1	6
60–69	3	2	5	1	0	1	0	1	1
73–74	1	1	2	0	0	0	0	1	1
Total	138	68	206	37	16	53	43	22	65

MAP 1—Geographical Distribution of Western Equine and St. Louis Encephalitis in California for 1939, 1940, and 1941 as Determined by the Serum Neutralization Tests



fer. Antibodies for the equine virus predominated in the child's serum but were absent in that of the mother.

The individuals showing a combined antibody response were mainly from 7 to 30 years of age. More of these were positive among the younger groups than were those reacting to the St. Louis strain alone.

GEOGRAPHICAL DISTRIBUTION

It has been previously demonstrated [2,6] that human equine encephalomyelitis occurs in certain definite localities of California. It not only reappears in the same counties but in the same towns or rural districts. Quite often these regions are associated with swampy low lands near irrigation canals or pools of stagnant water. Since the two central valleys have rivers draining from the high Sierra Mountains on the east and from the Coast Range on the west, the water tends to concentrate in the center of the wide valleys over extensive areas. This portion is also the center of population and of agricultural industries. The distribution of the disease for the years 1939, 1940, and 1941 may be followed by reference to Map 1. It must be taken into consideration, however, if the large cities are designated, that the patients resided mainly in the outlying districts. The majority have originated from rural areas, small farms or homes of about an acre on which chickens and other domestic fowl, cows or other animals may be present. Though the affected place may be free of such animals, they are often found somewhere in the neighborhood. Everywhere in the endemic areas, mosquitoes are present some time during the spring or summer.

It is of interest that the individuals showing antibodies to the St. Louis virus often reside in the same regions

where the equine disease is prevalent both among man and horses. A glance at the map shows that the similarity of distribution is striking.

SEASONAL INCIDENCE

Each year there is a definite seasonal occurrence for both of the encephalitic diseases. The first human cases may appear about May or June in the southerly counties of the San Joaquin Valley and later in those further north. They are prevalent during the hot summer months and often continue into the fall or even winter if the weather remains warm. This condition is especially noticed in Kern and Fresno Counties.

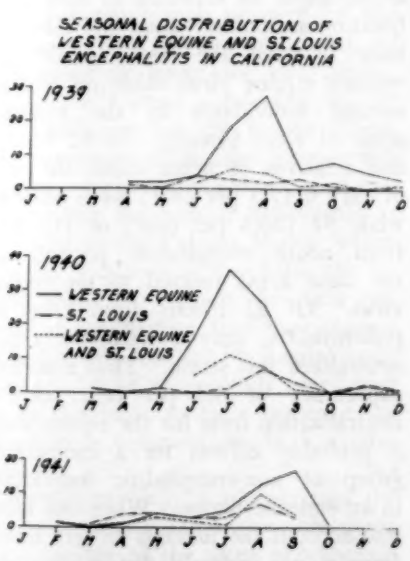

SEASONAL DISTRIBUTION OF WESTERN EQUINE AND ST. LOUIS ENCEPHALITIS IN CALIFORNIA
1939
1940
WESTERN EQUINE
ST. LOUIS
WESTERN EQUINE AND ST. LOUIS
1941
J F M A M J J A S O N D

CHART 2—Seasonal Incidence of Western Equine and St. Louis Encephalitis in the Central Valleys of California for 1939, 1940, and 1941

The highest incidence of the equine type throughout the two central valleys, as estimated by the number of serum neutralization tests was in August for 1939, in July for 1940, and in September for 1941 (see data in Chart 2). The cases with antibodies only for the St. Louis virus exhibited the same seasonal appearance with a slightly higher incidence in August. When antibodies were demonstrated for both types of viruses, the cases usually followed the distribution given for the equine form.

In order to correlate the seasonal appearance of encephalomyelitis in the human population with that among the horses, the official reports to the State Department of Agriculture have been used through the courtesy of Dr. C. U. Duckworth. It was noticed that if the data for the valley counties as a whole were compared, the frequency of the equine disease paralleled that of the human, but if they were considered by separate counties, the greatest incidence for the horses occurred approximately one month prior to that for man. This regional difference is in all probability conditioned by the late appearance of an insect vector in the more northerly sections of the state.

It should be emphasized that the cases in horses which come to the attention of the veterinarians, have been diagnosed almost entirely by the clinical symptoms unconfirmed by laboratory findings, while the majority of human encephalitides have been differentiated by the serum neutralization test. Nevertheless, in the counties with the highest incidence, sick horses and human cases of encephalitis are often in close, but not necessarily intimate association. Affected individuals may not possess a horse, yet sick animals might be within one-half to one mile distance.

Not only is the seasonal incidence coincidental for the two encephalitic diseases but poliomyelitis also occurs simultaneously in the same areas. In Kern, Tulare, and Fresno Counties the incidence of poliomyelitis may fluctuate each year but nevertheless sporadic cases are always to be found. Both these diseases are definitely endemic.

PRESENCE OF NEUTRALIZING ANTIBODIES IN HORSE AND FOWL SERA

The simultaneous presence of neutralizing substances for both the St. Louis and the western equine viruses in many human sera and the demonstration of antibodies against the latter strain in the sera of domestic fowl[9] prompted the further examination of blood samples of animals from different regions. Since a preliminary report has already been made,[10] only a brief statement is deemed necessary. It was found that antibodies against the St. Louis and the western equine viruses could be demonstrated in a certain percentage of both horse sera and those of domestic fowl; chickens, turkeys, ducks, pigeons, pheasants, and peacocks, and that more positive results were obtained from endemic than from non-endemic areas. The sera of 32 chicks hatched in the laboratory were all negative. Comparatively few sera showed antibodies only for the St. Louis virus. However, the percentage was high, 77.7 per cent of 46 animals, when the sera yielded reactions for both types.

With the exception of a few horses, most of the animals tested were apparently normal. It has been demonstrated by Ten Broeck[11] and by Howitt[9] that domestic fowl may remain clinically unaffected by the equine virus and yet carry the latter in the peripheral circulation for a certain period of time. Further experiments have shown that young chicks may remain well after inoculation with the St. Louis strain and yet harbor virus in the blood through the 30th hour. The possibility of these inapparent infections in relatively insusceptible animals, especially fowl, strongly suggests the barnyard as a potential reservoir for the encephalitic viruses, particularly since both types have recently been recovered from the mosquito, *Culex tarsalis*, by Hammon, Reeves, Brookman, Izumi, and Gjullin.[12] Hammon and associates have also[13] reported the results of testing the sera of a large group of birds and mammals in the Yakima Valley and found a higher percentage neutralizing the equine or the St. Louis viruses among domestic than wild animals.

NEUTRALIZATION TESTS ON SERA OF NON-ENCEPHALITIC INDIVIDUALS

It has always been a question as to what interpretation to place on the results of the neutralization tests for the encephalitic cases. Does a positive test indicate contact with the disease and how many members of the population might be expected to have neutralizing antibodies? Buss and Howitt[6] have reported the tests against the western equine virus made on sera of normal individuals in the endemic areas of Kern County. Of 82 friends and relatives of acute cases, the sera of only 6 (7.3 per cent) were positive, while 97 (86.6 per cent) of 112 sera from acute encephalitic patients in the same areas reacted to the equine virus. Of 82 bloods from cases of poliomyelitis, only 5 (6.0 per cent) neutralized this strain. Thus a normal expectancy of 6.6 per cent positive neutralization tests for the equine virus is probably correct for a comparable group of non-encephalitic individuals in an endemic region. When one takes into account the findings on sera tested from a non-endemic district like the San Francisco Bay region together with the low figures for the normal group in an endemic area, the higher percentages for the acute cases acquire definite significance and the test would appear of value as a diagnostic aid for the equine disease.

The results, however, are not as conclusive in regard to the value of the neutralizing antibodies against the St. Louis virus, since many human beings in the general population may be

affected in an endemic region. In a series of 144 sera received from people in the Bay Area during the past 3 years, only one (0.6 per cent) has given a weakly positive reaction. In another group of sera from poliomyelitic cases in the coastal city of Tacoma, Wash., only 4 (6.4 per cent) were positive to the St. Louis virus as compared to 28 per cent or 7 times the number reported by Hammon [14] and by Hammon and Howitt [15] for a group among non-encephalitic people in the endemic Yakima Valley, Wash.

Blood from a comparable group of either poliomyelitic patients or normal contacts has been tested from the valley regions of California. Of 95 sera, 15 (15.7 per cent) were positive for the St. Louis virus or an expectancy of over twice as many for this disease among the normal population in the same areas as for the equine strain. The percentage of positive tests in this endemic region was about one-half that among the normal individuals as for those in the Yakima Valley, where a higher incidence is found for the St. Louis virus.[14,15] From the data collected it would seem that the presence of antibodies for the St. Louis strain may not be as etiologically significant in the diagnosis as their presence for the western equine virus in a similar area.

Notwithstanding, it appears that the St. Louis virus is the responsible agent for a number of the acute encephalitic cases in certain districts and that the presence of protective substances in the blood would be of diagnostic importance among the younger age groups. Positive tests for this strain alone were obtained on the sera of 2 encephalitic infants under 1 year and on those of 7 when in combination with antibodies for the equine virus. Six children under 6 years of age were also positive only to the St. Louis virus. The ages responsible for most of the positive tests, however, remain in the older groups, mainly 12 to 30 years.

In most localities the western equine virus is apparently the more predominant agent of the 2 diseases as shown by the greater number of positive protection tests among the acute cases, although the St. Louis type has been more in evidence in Tulare County during 1940 and 1941. A total of 140 tests were positive for only the equine strain as compared to 55 for only the St. Louis during the past 3 years, or over 2½ times as many for the equine virus. Although the St. Louis strain itself has not so far been recovered in California, yet it seems likely that it is present, but not of as great a significance as the western equine virus.

NEUTRALIZATION TESTS ON SERA FROM OTHER CALIFORNIA DISTRICTS

While the major portion of the blood samples have come from the two central valleys of California, yet a small number have also been received from the southern part of the state. No positive tests were obtained against the equine virus until 1941 when the serum of one man from Orange County contained neutralizing antibodies. The patient resided in the town and seldom went elsewhere. Horses, however, have been known to contract encephalitis in the same county, so that the virus is probably to be found.

It seems probable that the St. Louis virus may likewise be responsible for human cases in these districts, since in 1938 encephalitis was reported in Riverside. At that time 6 (46.1 per cent) of 13 sera were positive for the St. Louis virus and none for the equine. The serum of one was weakly positive at first and became stronger after recovery. Seven sera did not react to either strain, although 3 of them were tested again several months after the onset. It seems likely that the St. Louis virus was responsible for this

small outbreak even though no active agent was recovered.

Because the eastern virus of equine encephalomyelitis has recently been reported in horses as far west as Texas,[16] there might be a possibility of such an occurrence along the Pacific slope. Sera have been received from many encephalitic patients in the coastal counties but all have been negative to the western virus. Likewise certain individuals in the central valleys have been clinically typical of encephalitis but without antibodies to the viruses used even after repeated tests. For this reason 11 sera from Kern County and an equal number from the Bay region and neighboring counties were tested against the eastern equine virus. Ten cases positive to the western strain from the valleys were also included. All sera so far have been negative except from one patient in Alameda County. He had been given large amounts of drugs and antimeningococcus serum as well, so that there is a possibility of an inhibitory action on the virus. Unfortunately no more serum was obtained to determine whether the blood became negative later.

DISCUSSION

From the clinical histories and from the results of many neutralization tests made each year, it seems evident that the virus of western equine encephalomyelitis has become endemic for man in California, probably for a longer period of time than can be estimated. Undoubtedly many cases have passed as non-paralytic poliomyelitis. Although the disease has never reached the epidemic proportions reported by Leake [17] in 1941 for North Dakota and the northern midwestern states, yet the constant recurrence each year in the same localities renders a burden on the community and leads to a condition of disquiet in the rural population during the summer season. It is true that many cases recover without residual effects, but on the other hand all stages of the disease may be seen, hence the physicians are becoming cognizant that permanent defects to the nervous system may be expected. The neutralization test has been of value in the diagnosis of these cases that now are referred to the urban physician from rural communities for consultation. Often they appear many months after the acute attack, with eye defects, personality changes or a state of mental retardation bordering on imbecility. These residuals have been less frequent among adults, although eye troubles and headaches may persist for some time.

The history of a particular case illustrates the sequel. A 5 year old boy was taken ill in 1937. He had convulsions, was weak, emaciated, and was expected to die at any time, but recovered. His blood gave a positive neutralization test for western equine virus and was checked again in 1938. The boy improved physically but lacked coördination and spoke incoherently. In 1941, 4 years after the onset of the disease, he had grown strong but was mentally defective and still lacking in coördination.

Since it is now known [12] that the mosquito, *Culex tarsalis*, is capable of carrying the western equine and also the St. Louis virus, every precaution should be taken against mosquito bites in endemic areas; children especially should be protected. The attack rate of infants and young children under 12 years has been high in the valley regions, contrary to the findings of Leake [17] in North Dakota, where the adults were mainly affected.

In 1937, when cases of encephalitis first became of importance in the state, the evidence seemed to indicate the virus of St. Louis encephalitis as the active agent. Over 50 per cent of the encephalitic patients had neutralizing

antibodies for this strain in their blood but no virus was found.[18] After recovery of the western equine strain from man in 1938 and when the serum neutralization tests indicated the widespread incidence in these regions, the latter disease took precedence and the significance of the St. Louis encephalitis was correspondingly minimized. A combination of circumstances at the time of first reporting suggested that the antibodies for the St. Louis virus, especially if together with those for the equine, had been acquired previously. Many of the sera were from people in the older age group who could have had an earlier infection. Many individuals were migratory laborers and it was suggested that they had brought in the disease to the state or had acquired it through contact with their neighbors.

From experimental evidence and data collected since that period, it seems that the previous impression of introduction by the migrants, largely prompted by testing only human sera, should now be corrected. The finding of antibodies for the St. Louis virus in sera of horses, domestic fowl, and wild mammals, together with their presence in the blood of infants under 1 year, furnishes convincing evidence that this virus has been endemic in the state for some time, although it has not as yet been recovered from human or animal tissues. While there was no very marked difference in percentage between the number of tests positive for the St. Louis virus from normal people (15.7 per cent) and those with encephalitis (27.7 per cent), yet undoubtedly clinical cases are present.

It is probable that one is dealing with two types of encephalitis in the same community, due to two different viruses. Experimentally the strains are immunologically and serologically distinct, but by producing a mixed infection in monkeys it has been shown[19] that a highly virulent western equine virus may take precedence, inducing the symptoms and the lethal effect. The equine strain is recovered postmortem even though the St. Louis virus may be found in the blood during the first 48 hours after inoculation. Antibodies may be only weakly positive for the latter while those for the equine are promptly evident. It is possible therefore to have neutralizing substances in the blood due to a simultaneous infection with the two separate viruses. That this dual infection may explain the presence of both the equine and the St. Louis antibodies in the same human serum, has been proposed recently in regard to the outbreak of encephalitis in the Yakima Valley.[14,15] The possibility of the dual infection has been given further credence after recovery of both types of viruses from the mosquito as previously mentioned.

Mosquitoes have long been in association with both human and equine cases of encephalitis in California and since the disease is prevalent during the periods of greatest mosquito infestation and in irrigated, cultivated areas conducive to their propagation, it seems probable the same vectors are likewise the responsible agents for the encephalitides in this state.

SUMMARY

The study of encephalitis in California, based largely on the serum neutralization tests, may be summarized for the 3 years 1939, 1940, and 1941:

Of 498 human sera from cases of neurotropic virus disease in the central valleys including poliomyelitis, 213 (42.3 per cent) neutralized the virus of western equine encephalomyelitis, 55 (11.5 per cent) of 475 sera only the St. Louis strain, and 62 (13 per cent) both viruses. If the total amounts for the 3 years are considered, it is shown that 140 tests are positive only to the

western equine virus, exclusive of those in combination with the St. Louis strain, as compared to 55 for the latter virus alone or over 2½ times as many for the equine.

One hundred and forty-four sera from the San Francisco Bay region were negative to the western equine strain with only one (2 per cent) weakly positive to the St. Louis type, although 3 sera from other coastal counties reacted to the latter strain alone.

The western equine virus was recovered from 3 human brains and that of poliomyelitis from 3 others during the 3 year period.

There were over twice as many males as females among the total number of encephalitic cases, although when the ages were subdivided, no sex distinction was noticeable in the youngest age groups infected with the equine virus. All ages were affected by both types but the majority of cases were under 10 years for the equine, and in the years 13 to 30 for the St. Louis strain.

Cases of both the western equine and the St. Louis encephalitis were found mainly in the rural agricultural, irrigated sections throughout the two large Central Californian valleys with a definite seasonal occurrence for both diseases that rises to a peak in July or August or even into September.

A normal expectancy of 6.6 per cent positive neutralization tests for the western equine virus was found among the normal population in an endemic area as compared to 15.7 per cent for the St. Louis strain in the same environment. Consequently more reliance may be placed in the test as a diagnostic aid for the equine disease than for the other.

The sera of 32 encephalitic cases were negative to the eastern equine virus of encephalomyelitis.

Of a small group of sera tested from Southern California during the 3 years only one showed antibodies against the western equine strain, although this virus has been isolated from horses in similar localities. Six cases of encephalitis from one county, however, had neutralizing antibodies against the St. Louis virus.

Occasional residual effects to the central nervous system may be expected after infection with the virus of western equine encephalomyelitis, especially among the children.

From the epidemiological, clinical, and laboratory evidence one may conclude that the virus of western equine encephalomyelitis has become endemic in the central valleys of California for man and animals and that the St. Louis strain is likewise closely associated. From the finding of antibodies in the sera of fowl and mammals in endemic areas and in children under 1 year of age, it is apparent that the St. Louis virus has been in California for some time and is not imported from the midwestern states as formerly proposed.

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Tuberculosis Case Finding in Institutional Populations*

The Use of 35 mm. Fluorograms Among the Mentally Ill

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IT has long been common knowledge that any institutional population is particularly subject to endemic diseases such as tuberculosis. Not only is there a high prevalence of the disease in populations of many institutions, but there are also characteristic and inherent difficulties in its control and treatment in any such situation, especially when the commitment of its inmates to the institution was not a result of the disease. The problems that arise may be considered as primarily epidemiological but complicated by financial and other practical considerations over which institution heads and staffs generally have only limited control.

In any but a tuberculosis institution, an administrator's concern about the disease assumes a peculiarly baffling and progressively serious nature as new advanced cases appear among the inmates. If, however, a hospital or other institutional superintendent had at his disposal a method by the use of which, at moderate or small expense, he might identify early sources of tuberculous infection whose presence in his institution is most dangerous to it, a great part of his tuberculosis problem would be solved. It is with the use of such a technic that the present paper is concerned. Granting the importance of other aspects of tuberculosis control as they apply to a congregate population, the present discussion will be confined to the practical matter of early and accurate detection of cases of pulmonary tuberculosis in one type of institution, a state hospital for the mentally ill.

Among institutional populations, the mentally ill are numerically of considerable importance; in the United States nearly 500,000 such patients are hospitalized in state institutions alone. Of that number a significant proportion were tuberculous before commitment or have become so in the course of residence. Since the type of institutional medical care available in hospitals for mental patients does not effectively control the disease, the need for special tuberculosis case finding is felt perhaps more keenly in this sort of population

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than in any other. Especially is the statement true whenever hospitals for the mentally ill are handicapped by shortage of personnel or funds, and lack of facilities for chest examination, particularly by roentgenogram.

OBJECTIVE OF THE PRESENT STUDY

It was with some of the foregoing considerations in mind that the Division of Public Health Methods of the National Institute of Health and the Medical Unit of the (Minnesota) Division of Social Welfare began, in 1939, a cooperative experiment to test the efficiency of the 35 mm. fluorogram. The work previously reported by de Abreu [1] from South America and Holm [2] from Denmark had already served to strengthen the feeling that the 35 mm. fluorogram might well be the answer to the question of inexpensive mass case finding. There has now been tested in the Anoka (Minnesota) State Hospital a practical portable fluorographic apparatus which seems admirably suited for use as a screening device in large institutional populations, particularly in states with a number of institutions. The objective of the study was to determine the usefulness and accuracy of 35 mm. fluorograms in the roentgenographic detection of pulmonary tuberculosis.

The plan of testing was to take small (35 mm.) films and, for definitive diagnostic purposes, simultaneous large (14" x 17") x-ray films, of all patients who could coöperate, and of all employees. As the plan eventually worked out, about 400 of the 1,264 large films were taken some time before their corresponding small ones; but the remainder were taken simultaneously.

It was recognized at the outset that because of the nature of their illness it is difficult to obtain uniformly good x-ray films of mentally ill patients. Due to physical deformity, many patients could not be placed in proper position; many also resisted the efforts of employees to assist them. It was in some instances, therefore, necessary to give the patients strong sedatives before attempting x-ray examination of them. It was necessary, almost routinely, to bind the upper part of the patient's body to the cassette, so as to obtain and maintain reasonably good positioning. In many cases the patients could not coöperate by taking a deep breath and holding it during the exposure. In evaluating results of a comparison of small and large x-ray films one must therefore remember the handicaps under which both were taken.

Apparatus—The apparatus for the experimental study is of simple construction and consists essentially of an H-shaped cast iron standard, a rotating-anode x-ray tube, and a light-tight metal box. The latter, in the shape of a truncated pyramid, has attached to one end a Patterson fluorescent screen (type B) and to the other a Zeiss Contax camera with an f, 1.5 lens. The camera is focused on the exact center of the fluorescent screen. The distance from the screen to the target of the rotating anode tube is 42". The machine is not expensive nor is it difficult to transport, and can be used with any transformer that will deliver a 150 milliampere current at 60 to 90 kilovolts. Such a transformer, usually found in state institutions, can easily be connected to the machine and can also be calibrated without great difficulty.

Reading the films—Prior to, and entirely independent of the reading of the 14" x 17" plates, 35 mm. films were read by transmitted light with direct magnification viewers (Leitz) by two physicians (H.E.H. and R.B.H.), neither of whom is a roentgenologist. It should be made clear that the object of the reading of the small films was not definitely to diagnose pulmonary tuberculosis, but rather to find parenchymal lesions of the lungs in all pa-

tients needing further study for final diagnosis. Accordingly, the 35 mm. films were classified as follows:

1. *Abnormal,* with immediately apparent clearly visible, definite shadows of the lungs that appear characteristic of reinfection type tuberculosis
2. *Suspicious,* with markings of any kind in the parenchyma of the lungs that could not immediately be interpreted as definitely abnormal but were also not within the range of normality of appearance
3. *Negative,* with no abnormal or suspicious markings in the parenchyma of the lungs, or with only the types of shadows ordinarily interpreted as representing calcification from first infection tuberculosis, or old thickened pleura

Later the 14″ x 17″ films were interpreted by a qualified roentgenologist with extensive experience in reading chest roentgenograms. The National Tuberculosis Association's recommendations were followed in classifying lesions as *minimal, moderately advanced,* or *far advanced*—with two additional categories, " reserved diagnosis or suspect " and " no reinfection type tuberculosis."

The sample—In the Anoka (Minnesota) State Hospital in the first 8 months of 1940, it was possible to obtain a 14″ x 17″ x-ray film and a 35 mm. film of reasonably good quality for each of 1,264 cases. The institution population was distributed by age and sex as shown in Table 1.

TABLE 1

Age	Total	Male		Female	
		Number	Per cent	Number	Per cent
Total, all ages	1,264	387	100.0	877	100.0
15–24	9	3	0.8	6	0.7
25–44	266	82	21.2	184	21.0
45–64	649	197	50.9	452	51.5
65 and over	340	105	27.1	235	26.8

It will be noted that more than two-thirds of the group were women and that the age distribution was quite similar for each sex.

RESULTS OF THE SURVEY

As of January 1, 1940, it was known that 66 of the 1,264 patients in the hospital had reinfection tuberculosis. There were 39 minimal, 17 moderately advanced, and 10 far advanced cases, according to the N.T.A. classification. In addition to the 66 known cases of tuberculosis the 14″ x 17″ x-ray film survey found 180 new cases; 119 of which were minimal, 57 moderately advanced, and 4 far advanced. Of the total of 246 cases, representing 19.5 per cent of the population, 158 were minimal, 74 moderately advanced, and 14 far advanced. In addition, there were 56, or 4.4 per cent of the population, classed as " reserved diagnosis " cases.

As is shown in Table 2, the 35 mm. films were read as abnormal or suspicious in 301 cases, 23.8 per cent of the group examined. There were thought to be definite abnormal shadows in 182 cases (14.4 per cent) and suspicious lung markings in 119 (9.4 per cent). However, 11 of the 35 mm. films read as abnormal and 20 as suspicious were " over-read " since the corresponding 14″ x 17″ plates were interpreted as negative for tuberculosis. The " over-reading " applied, therefore, to 31, or only 3.2 per cent of the 962 negative cases. Errors of interpretation were due mainly to the difficulty, on small films, of visualizing the apices and the extreme periphery of the upper lung fields. However, aside from the 31 cases, examination of the 35 mm. films of 1,264 patients interpreted 13.3 per cent as

having definite abnormal lung shadows, and 7.3 per cent, suspicious lung markings.

Considering in each instance the reading of the 14" x 17" films as a standard, the 35 mm. films missed 11.4 per cent, or 18 of the 158 minimal, and 4.1 per cent, or 3 of the 74 moderately advanced

Case 2,406—Nodular tuberculosis in the left apex and fibrosis in the first interspace, also right apex, first and second interspaces.

(Apices are hard to visualize on 35 mm. x-ray pictures of uncoöperative mental patients because of the difficulty of obtaining deep inspiration and good positioning during exposure. Likewise, fine fibrosis is difficult to visualize on small films with present technic.)

TABLE 2

Comparison of X-ray Findings on 14" x 17" and 35 mm. Chest Films by NTA Diagnosis on 1,264 Mental Patients at Anoka (Minn.) State Hospital, 1940

Reading of 35 mm. Film	Total Cases	Diagnosis by 14" x 17" Film (NTA Classification)				
		Minimal	Moderately Advanced	Far Advanced	Reserved or Suspect	No Reinfection Type Lesion *
			Numbers			
Total	1,264	158	74	14	56	962
Abnormal or suspicious	301	140	71	14	45	31
Abnormal	182	79	60	14	18	11
Suspicious	119	61	11	..	27	20
Negative*	963	18	3	..	11	931
			Percentage Distribution (NTA)			
Total	100.0	100.0	100.0	100.0	100.0	100.0
Abnormal or suspicious	23.8	88.6	95.9	100.0	80.3	3.2
Abnormal	14.4	50.0	81.0	100.0	32.1	1.1
Suspicious	9.4	38.6	14.9	.....	48.2	2.1
Negative*	76.2	11.4	4.1	.....	19.7	96.8
			Percentage Distribution (35 mm. Readings)			
Total	100.0	12.5	5.9	1.1	4.4	76.1
Abnormal or suspicious	100.0	46.5	23.6	4.7	15.0	10.2
Abnormal	100.0	43.3	33.0	7.7	10.0	6.0
Suspicious	100.0	51.3	9.2	...	22.7	16.8
Negative*	100.0	1.9	0.3	...	1.1	96.7

* Includes first infection type lesions and thickened pleurae.

lesions; but none of the 14 far advanced cases. In other words, the small film technic missed only 3 of the 88 advanced cases of greatest potential danger to the population group involved. Eleven of the 56 " reserved diagnosis " cases were read as negative on the small films.

The 3 moderately advanced cases (all found to be clinically inactive) which were missed in the reading of small films were also of types apparently difficult to interpret except on 14" x 17" plates of better than average quality. In order more fully to explain this statement, the large film x-ray findings for each of the 3 cases are given below:

Case 865—Old fibrosis both upper lobes, thickened pleura both upper lobes.

(Old fibrosis does not show up well on 35 mm. films if the linear or fibrotic markings are very thin, and especially if the case shows both fibrosis and thickened pleura.)

Case 1,305—Right lung was clear. There is extreme thickening of the pleura on the entire left side. Evidence of old tuberculosis in left apex and left clavicular region.

(The 35 mm. film showed an area of increased density over the entire left side, suspected as pleural thickening, but no markings were noted in the parenchyma.)

However, it may be said that review of the small films for cases 865 and 1,305, and direct comparison with cor-

responding large films, has indicated that these two types of lesions would rarely be missed in future readings of small films. Once seen, they are thereafter quite recognizable.

DISCUSSION

Tuberculosis creates serious administrative and epidemiological problems within institutions with large populations unless cases are diagnosed before they reach a communicable stage. Early and accurate detection of advanced cases is a matter not only of epidemiological, but also of economic importance both to institution heads and the general public alike. Primarily for the protection of the inmates and employees of the institution itself, it therefore becomes an obligation of the responsible officials of the institution to identify and segregate its communicable cases of tuberculosis. Furthermore, since many types of institutions (those for the mentally ill, among others) parole their inmates, there is further obligation to the general public not to release into it known sources of infection. All these advantages of early diagnosis are, of course, in addition to the more personal ones for the diseased individuals themselves.

In the type of institution in which this study was made, early diagnosis is especially advantageous in that, in states having a number of hospitals for the mentally ill, one may be set aside and used for the tuberculous. In that way specialized clinical and surgical services need not be provided in all institutions, nor need there be so many (usually part-time) trained consultants as would otherwise be necessary. Administratively, such a plan should work out quite well in that it is less expensive, more practical, and more effective as a means of communicable disease control than it is to have a large isolation unit in each institution.

In view of experimental results reported here there appears to be an excellent place in the field of institutional tuberculosis control for the small x-ray film method. Although in the experiment the physicians who read the small films " under-read " 21 of the 246 films showing pulmonary tuberculosis, all but 3 were only minimal lesions and those were clinically inactive. If the testing apparatus had been used in actual practice as a screening device preparatory to further diagnostic testing with 14" x 17" x-ray films and appropriate clinical and laboratory procedures, its efficiency, in so far as the finding of dangerous cases is concerned, would indeed have been very high. On the other hand, the error of " over-reading " as abnormal or suspicious those films with no evidence of disease was also relatively not large—31 of 962 cases. Again, in actual practice, 31 large plates would have been taken unnecessarily—a not very serious loss considering the number of cases found and the size of the population examined.

However, there is every reason to believe that when technicians and the physicians who interpret films acquire further experience, both kinds of errors will be materially reduced. After they have handled a number of cases of a specific type, it seems reasonable to assume that the quality of films on that type can be improved, although there will always be some patients that are difficult or impossible to examine by x-ray successfully. When physicians gain more experience in what to look for in the small films and understand more fully the significance of what they see, interpretation will undoubtedly become more accurate.

The low cost of the 35 mm. fluorogram is obviously one of its strongest recommendations, if it is to be used in mass case finding in very large populations. Aside from the cost of equipment, electricity and the salary of the staff, each 35 mm. x-ray film costs

about 1 cent processed—or about 1/50 as much as a 14″ x 17″ plate. In addition, less personnel, time, and storage space are required for 35 mm. films than for larger films. A technician, an assistant technician, and a clerk, acting as a crew, can produce, depending on the coöperation of patients and employees of the institution, from 200 to 500 small films a day with ambulant subjects. In institutions whose inmates can coöperate (prisons, for example) the number per day can be doubled. Hence a unit, such as has been described, if used on a state-wide basis with a traveling crew, would ordinarily need to spend only a few weeks at any but the larger institutions. In most states at least one x-ray film a year could be taken of all suspected persons or even all not known to have tuberculosis, and adequate follow-up, an essential of tuberculosis control, could be maintained.

It should not be inferred from what has been said that the 35 mm. fluorogram is considered the only alternative to the 14″ x 17″ x-ray film. The paper film technic has been fully developed and such plates are much less expensive than standard 14″ x 17″ films. However, there is a tendency among many physicians not to accept paper films with the same degree of reliance as they do standard plates. Potter, Douglas, and Birkelo [8] have been very successful with a 4″ x 5″ film but the apparatus is quite expensive and the operating costs are greater (films, developing, storage, labor). Fluoroscopy is also satisfactory from a diagnostic point of view, but, again, it does not produce a permanent record of the kind considered adequate to guide subsequent clinical management; and, more important, there are few flouroscopists in state institutions. Because of the restrictions involved in the use of any of the three methods just mentioned, it is believed that the 35 mm. fluorogram offers the most practicable solution to the problem.

SUMMARY

A portable and inexpensive fluorographic unit, using 35 mm. film in a standard camera and transportable 200 milliampere x-ray equipment, was tested in a state hospital for the mentally ill. Of the more than 1,200 patients, all of whom were tested, few could coöperate and many were deformed and otherwise physically not good subjects; yet the apparatus was efficient in discovering a very large proportion of the advanced cases of tuberculosis in the population. In fact, over 150 cases of tuberculosis, in addition to the 66 known before the experiment, were identified in the course of it. The readings of small films were checked against independent interpretations of corresponding standard x-ray plates, with the result that the errors of both over- and under-reading were found. In neither respect was the lack of correspondence great enough to cause concern about the essential accuracy of the technic as a screening device, even among uncoöperative subjects.

The results of the experiment lead to the belief that the technic and apparatus used are, even without further refinement,* sufficiently accurate to warrant their widespread adoption by states for use among institutional populations, particularly if the state has a number of large institutions. Routine "screening" or identification of communicable cases of tuberculosis, and periodic rechecking of suspicious cases, would then be possible at a small fraction of the cost of using standard 14″ x 17″ x-ray film equipment. If also segregation and

* As a result of this preliminary work, the Division of Public Health Methods of the National Institute of Health has set up a comparative photoroentgenographic study under Dr. Willis Beasley, psychophysiologist, to make an intensive technical evaluation of these procedures. Dr. Beasley assisted in the development and construction of the experimental fluorograph used in this study.

treatment were further centralized, the advantages to the patients themselves, the institutional employees, and the general public would be very important not only from the point of view of communicable disease control but also from that of substantial economy.

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Industrial Nutrition and the National Emergency*

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IN the present national emergency, we are sparing neither men nor money to provide the best engines of war that we can contrive. In mechanized warfare, from 6 to 18 men must work at home for every man stationed in the first line of defense. The whole fabric of our industrial organization, which is the backbone of our national emergency, depends on the productive effort of the men and women in industry. Our modern knowledge of nutrition can make a major contribution to this effort whose benefits will remain long after the present crisis has passed.

There is an interesting example in a recent experiment which suggests how improved nutrition may, in an unexpected manner, alleviate the strain of work in industry. Rats are sensitive to high pitched sounds. Many rats, after a few days, are thrown into convulsions by exposing them to a high pitched note for one minute a day. These convulsive seizures occur whenever the note is sounded. It was found in young animals 2 to 4 months old already on a fairly good diet that the susceptibility to these seizures can be reduced by liberal supplements of the vitamin B complex. Although some improvement was obtained with thiamin alone, the best results were obtained by supplementing the diet of each rat with 20 gammas daily each of thiamin, riboflavin and pyridoxin. This supplement with synthetic vitamins was as effective as 2 gm. of brewers' yeast daily.

It will be interesting to ascertain whether workers exposed to a great deal of noise require more than ordinary amounts of the vitamin B complex.[1]

It has been observed in Britain that the improvement of the diet of workmen which was not up to standard for good health was followed by increased output without any increased effort and also by a reduction in the number of accidents; as a result, many factories are now providing a good meal for their employees.

Nutrition workers have known for some time that men maintained on vitamin deficient diets become more easily fatigued and suffer from lassitude and loss of interest in work. The more active the person the sooner the severe symptoms develop. Other symptoms known to occur in vitamin deficient individuals are depressed mental states, soreness of muscles, and backache. The significance of these symptoms for men engaged in war work needs no emphasis.

These considerations would not concern us if it were known that our workmen consumed adequate diets; unfortunately the opposite is true. A number of studies indicate that millions of people in this country are living on diets below the safety line. It has been said "nutritional diseases in all probability constitute our greatest medical problem, not from the point of view of deaths,

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but from the point of view of disability and economic loss."

In a well known survey carried out by Stiebeling and Phipard of the U. S. Department of Agriculture, it was found in four great geographical regions from coast to coast among employed non-relief workers that the distribution of good, fair, and poor diets was approximately as follows: poor 50 per cent, fair 35 per cent, and only 15 per cent were classed as good. The chief difference between "good," "fair," and "poor" diets is in the amounts of vitamins and minerals they contain.

The extent of malnutrition in this country is worse than these figures indicate because the diets classified as "fair" are in reality unsafe diets. The following were the standards for a "fair" diet:

Protein	50	gm.
Calcium	450	mg.
Phosphorus	88	mg.
Iron	10	mg.
Vitamin A	3,000	I.U.
Vitamin B_1	333	I.U.
Ascorbic acid	30	mg.
Riboflavin	0.9	mg.

The amount of vitamin A is not sufficient for normal dark adaptation in many individuals. The amount of vitamin B_1 is barely sufficient to prevent beriberi, with no margin of safety. There is barely enough protein to prevent loss of body protein. The amount of vitamin B_2 is insufficient protection against cheilosis. It is an astonishing and disquieting fact that in a country as rich as the United States in food, transportation, and industrial organization, only 15 per cent of the employed workers had diets better than this.

A nutrition survey was carried out in Pasadena between May and August, 1938, under the direction of W. L. Halverson, Medical Health Officer of Pasadena, and the writer. Our findings in this region confirmed those of Steibeling and Phipard.

In any planned attack on malnutrition in the war industries we must consider the causes of the widespread malnutrition in this country. One of them is no doubt economic—29 per cent of the non-relief families during the years 1935 and 1936 in villages and cities had incomes below $1,000 a year. It would have been impossible even with expert nutritional knowledge for these people to purchase a "good" diet. Investigation showed that only 25 per cent of these families bought "fair" diets, 75 were "poor." The economic factor would be the most important one if our objective were limited to the prevention of severe nutritional diseases such as xerophthalmia, beriberi, pellagra, and scurvy.

When optimum health is our objective, then the economic factor becomes of secondary importance. Referring again to the survey of Steibeling and Phipard, 43 per cent of the non-relief families living in villages and cities had incomes between $1,000 and $2,000 a year. In this group, where the economic factor is unimportant as a determinant of the quantity and quality of food provided, only 25 per cent had "good" diets, 65 per cent were "fair," which we have seen is really an unsafe diet, and 5 per cent were bad. In the group of families with incomes of $5,000 or more, 65 per cent had "good" diets, 30 per cent were "fair," and 5 per cent were bad.

Anyone who has computed the amounts of the nutritive essentials in actual dietaries knows that even the well-to-do, who can eat what they want, as much as they want, and are reasonably intelligent about it, do not and cannot, unless they possess the necessary technical knowledge, obtain a diet which will afford optimum health. The chief difficulty is in obtaining enough of the vitamin B complex. What then is the situation among those whose incomes are in the middle and lower brackets?

How much could we save in dispensaries and hospitals if the middle and lower classes, who comprise by far the great majority of our population, had first class diets from childhood?

One reason for this widespread inadequacy in our diet is well known. Modern processes remove the vitamins and minerals from wheat, corn, and sugar in the milling and refining. Today less than 10 per cent of the vitamin B complex in the wheat grown in this country is actually eaten by human beings, although subclinical vitamin B deficiency is widespread in all economic classes.

There is no use in crying over spilled milk. The nation will not eat whole wheat flour and bread. Furthermore it would require profound changes in the milling industry. In attempting to solve industrial nutritional problems, we must, at least for the period of the emergency, use such methods as do not call for a revolution in processing methods, nor for great changes in eating habits. Or we shall fail. The new knowledge of nutrition with the aid of the new food technology can provide an optimum diet for all, if we will be rational about it.

Whatever measures are taken, there is one absolute prerequisite; that is that public health and other officers concerned with protecting our food have at least some appreciation of the new knowledge of nutrition. I heard not long ago of one of our state officers concerned with food and drug inspection who stated that he did not need vitamins, that very few people do. When informed of a recent federal rule that vitamins be classed as foods, he stated that he would do all he could to obstruct such a rule from becoming permanent.

I wish this outspoken officer would submit to the simple experiment of living on a diet which contained no vitamins for as short a period as 2 months on the familiar washed casein, cane sugar, lard and, possibly by way of indulgence, cow lick for minerals. He could be allowed water ad lib. If he survived the 2 months' experiment, I am sure he would become a zealous evangelist for vitamins. New converts are the most devout.

The education of the public to the harmful consequences of polluted drinking water and milk has greatly helped the public health officer in providing safe water and milk. In the same way, if the public knew that among the consequences of mild but prolonged nutritional deficiency disease in adults are, among others, the many aches and pains of middle and old age, defective vision in dim light, dyspepsia, thinning of the bones, it would be easier for public authorities to provide a richer vitamin and mineral intake in our staple foods, it would encourage food processors to provide the public with a variety of foods adequately enriched with vitamins and minerals.

Conversely, an informed public will appreciate the limits of what can be expected from improved nutrition. Many diseases and illnesses, for example, cancer, measles, diphtheria, pneumonia, cannot be significantly alleviated or cured by any conceivable increase in vitamin and mineral intake. It is well to be on guard against the uninformed enthusiast (public, private, or commercial); he is nothing less than a quack.

Turning now to the special problem of improving the nutrition of our workers in the war industries, whatever methods are chosen, they must satisfy these requirements:

1. There must be no disturbance in factory routine.

2. There must be no interference with production.

3. We must not, by trying to get men to eat unpleasant foods, give them cause for complaint.

There are many difficulties to be overcome in this field. The first is that the level of popular nutritional education is so low. This is responsible in part for the high percentage of so-called "fair" diets in the middle classes. Another difficulty is that people are slow to change their eating habits. Most people in this country refuse to eat whole wheat bread. It is more serious than a joke that many men simply detest green vegetables and will not eat them. Many will not drink milk. The common superstitions regarding acid and alkaline foods, many so-called allergies, and the necessity for keeping on the "alkaline side" deter many from eating citrus fruits. I am sure every reader can multiply such examples.

Another serious difficulty in the problem of industrial nutrition is the poverty of cooking and serving facilities in our factories and in the homes of these workers. This is especially true in the new industries which have sprung up so rapidly. For example, one important factory in this region contains cafeteria facilities for 3,000 men; there are 26,000 men employed in that plant. Another employs 50,000 men and has no cafeteria facilities. The most that it can supply is hot coffee. If one passes by such a plant at noon, he sees men sitting on the pavement or in their cars eating sandwiches made of white bread, drinking bottles of soft drinks. The neighboring "hot dog" and hamburger stands serve a thin meat or cheese sandwich, again on white bread. Only here and there does one see a bottle of milk. Fruit is even less in evidence, and vegetables are, of course, out of the question apart from the occasional innocuous pale looking lettuce leaves in a sandwich.

How do these workers eat at home? Here is a typical case. Four unmarried young men live together. One of them cooks for the four in return for which he does not pay any rent. The food consists essentially of some fried meat which is quickly prepared. They fill up on potatoes, white bread, some butter, practically no fruit or vegetables, although they are living in Southern California, and cream for coffee, but no milk.

There is no prospect at present of obtaining space or facilities for either preparing or serving even one meal a day in these new plants. This is not intended as a criticism of the management of our war industries. They are concerned with the great problem of turning out airplanes, ships, and instruments of war as quickly as possible, and we must sympathize with them. Every available bit of space is used for production machinery. If we are going to be helpful, we must recognize their difficulties, accept their estimates of what they consider necessary in the way of plant machinery and plant routine, and adapt our recommendations to their difficulties as they envisage them. In any case, management knows the familiar and tangible problems of production. No one can criticise them for being unfamiliar with the less tangible factors such as the importance of good nutrition, especially when the effects are not immediately seen in production totals.

It is the task and duty of the nutritionist to try to improve the nutrition of the workers, and of the executives, without making demands which will curtail production, even temporarily. If we can do this, we have a case when we ask management and labor to be patient and wait for the long range beneficial effects of an improved nutrition to manifest themselves.

What lines of attack are open? The first line of attack which suggests itself is education in nutrition. Whatever methods are found suitable, I am certain that an intensive educational campaign will be necessary to insure the effective coöperation of both men and management. But it must be obvious

that if we wish to effect a significant improvement quickly, we cannot rely on education alone. As an example of the limits which can be achieved by educational methods alone, I may cite the case of milk—in the last 20 years, the per capita consumption of milk in this country has increased by only 4 per cent, in spite of a persistent and intensive educational campaign by public authorities from the federal government to teachers in schools. In addition, dairy products have now become expensive. I have already referred to the undesirability of attempting to disturb eating habits too much.

The special task of the scientific nutritionist is to ascertain what the nutritional problem is and, having ascertained what needs doing, to find practical remedial methods which management can accept. Our task does not end here. Whatever measures are adopted, to insure their effective and continued operation, a continued educational campaign must be planned and carried out in the plant and in the homes of the workers. The reasons are sufficiently obvious to need no elaboration here. We shall probably need and have to call on many social agencies. This, it seems to me, is the proper place of education in our national nutrition program—to assist positive measures, rather than to rely mainly on general education to improve the nutrition of the people. We have not time for that.

In this connection, I may quote from a recent article by Dr. W. H. Sebrell * of the U. S. Public Health Service:

> Just a few years ago, I took the point of view that the way to correct these conditions was to try to stimulate the increased consumption of foods naturally high in these vitamins. I still think that this point of view is correct theoretically. Although I recognize that such a program, if it succeeds at all, will progress so slowly that it cannot meet the extensive deficiency conditions in our population today; therefore, as I see it, the next best thing is to add these vitamins and minerals to foods which are consumed in large quantities, especially by the low income groups.

The new food technology can be very helpful here. The development of synthetic vitamins and vitamin concentrates is one of the important technological advances of our time. Seven vitamins can now be obtained more cheaply as synthetics than from foods or other so-called natural sources. In a recent release, the National Research Council emphasized that synthetic vitamins are identical in every respect—chemically, nutritionally, and medically—with those in foods. The same is true of vitamin concentrates. Good preparations containing synthetics or concentrated vitamins can be valuable supplements to even a good diet, and even more to diets which are restricted for whatever reason. The points to be considered in the use of such preparations are as follows:

1. What purpose are they intended to serve?
2. Would the use of any given concentrate really eliminate the deficiency it is aimed at?
3. Are they a good buy?

Regarding the general principle involved in the use of concentrates and synthetics, it is necessary only to quote from a release from the National Research Council:

> . . . There is ample reason to believe that any population receiving a diet fully adequate in vitamins, minerals, and other nutritive essentials is better able to withstand the stresses and strains of war or threats of war. Unquestionably, millions of Americans are not eating diets adequate in all essentials.

One significant point in this release is the absence of any mention of food as such: meat, milk, eggs, vegetables, and cereals. A food is adequate or inadequate to the degree to which it contains nutritive essentials. Nutritive essentials serve their nutritional purpose

* Read at the conference of bakers, millers, and others to coördinate the introduction of enriched flour and enriched bread, Chicago, March 5, 1941.

whether they are grown in the field, salvaged from agricultural wastes and made edible, or entirely synthesized in a factory. One need only point to the profound change in modern medical therapy since synthetic vitamins have become widely available.

A step in this direction has already been taken in the fortification on a national scale of white flour with vitamin B_1 and nicotinic acid. The addition of vitamin B_2 so far is optional. It is desirable that fortification with vitamin B_2 be made obligatory in "enriched flour" as soon as possible, because vitamin B_2 deficiency is very widespread all over the country, much more widespread than any one of us suspected a few years ago.

Federal authorities now agree that all fats, butter, margarine, and lard should be fortified with vitamins A and D. By so doing, we not only add greatly to the nutritional value of the fats used by the poor—margarine and lard—but even the nutritional value of butter can be improved. For example, winter butter can in this way be made as nutritious as the best summer butter.

A few employers of labor in this country are already convinced that the productive capacity of their workers can be improved by improving their nutrition. In most cases, they have, at their own expense, supplemented the diets of their workers with vitamin concentrates. There are a number of reports in the press on this subject. It does not appear, however, that these efforts have been supplemented by an orderly and systematic study of the nutritional state of their workers before and after the vitamin supplements were used, nor have they attempted to ascertain precisely what has been achieved by the vitamin supplement.

It seems to me that it is of the highest importance for public health nutrition that where measures such as these are taken the results of these measures be carefully recorded and studied. In spite of all the experimental work which has been done, the influence of diet on human health, on working capacity, on the incidence of accidents, and on the psychological state needs to be demonstrated by carefully organized and well controlled studies. We must be on our guard against extravagant statements and promises of what will be achieved. There can be no doubt that improvement in the health of the workers as a result of improved nutrition will be beneficial; but the particular respects in which these benefits will manifest themselves in this country remain to be demonstrated.

There is danger, of course, that the industrialist will be impatient and see in the scientific approach to these problems only another impractical academic survey which will take up a lot of time (of which we have none to spare at present) and money, and will end with unpractical and inconclusive results. Management must be made to see that, as an efficiency engineer cannot give any sound or useful advice without first appraising the existing mechanical situation, so the nutritionist must be allowed time, facilities, and opportunities to make a similar appraisal of nutritional status and facilities before he can make any useful recommendations.

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The Rôle of Public Health in the National Emergency*

FELIX J. UNDERWOOD, M.D., F.A.P.H.A.

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PUBLIC health undoubtedly faces one of the greatest challenges today since its evolution as a science. A horizon which seemed bright only a short time ago with opportunities for fulfilling long-sought public health aims and needs has been darkened. Today, we realize that these clouds are a threat to our many years of planning and accomplishment and that our very right to life, liberty and the pursuit of desirable objectives in coming years depends upon the strength of the defenses we build now.

No nation can profess strength whose people are physically unfit for efficient service. Consequently any intelligent war effort must give a large measure of consideration to the health status of its civilian and military populations. The present conflict is no ordinary war, but is primarily one between the total production and efficiency of the countries involved. In this light, public health assumes a rôle of importance second to none, not only in developing military strength but in producing the equipment for fighting, and in maintaining morale.

Total war presents tremendous problems which we can hope to solve only through intelligent coöperation, careful planning, and a willingness to sacrifice. There is a job for everyone and if our total effort is to be successful there must be a unity of purpose and a clear understanding of individual responsibility in this supreme undertaking for national safety and security.

Public health workers are more than glad to do their share in meeting the responsibilities of these times, and the medical and dental professions have demonstrated a like spirit. However, it cannot be emphasized too strongly that necessary service on the home front is equally as important as service in the Army. Even though we recognize aggressive war as our No. 1 problem, it behooves us not to be forgetful that a major phase lies in holding the health gains already made. We are deeply concerned, and rightly so, regarding the steady depletion of our trained personnel, as one by one our health officers, nurses, technicians, and sanitarians, on whom there have been spent substantial sums of money for training and equipment, report for needed military duty. We have expected that we would have to make some sacrifices, but it seems necessary to insist that there be a more equal distribution of all medical facilities, or the consequences may be regrettable.

The whole problem of drafting and calling to active military duty personnel employed in public health departments was considered at a special conference of State and Territorial Health Officers in Washington a few months ago. It was recommended that, in plans for

* Presidential address delivered before the Southern Branch, American Public Health Association, at the 10th Annual Meeting in St. Louis, Mo., November 10, 1941.

the war effort, the work of the official public health agencies be recognized as an essential part of the national program.

In spite of the steps taken in developing the Procurement and Assignment Service, it remains to be seen just what can be done with the limited personnel available to cope with the public health problems which existed before the emergency and as well to take care of the multitude of new needs which the present crisis has forced upon us. The large concentration of troops in camps and cantonments and the tremendous influx of new population brought about through industrial expansion have created problems of great magnitude in communicable disease control, sanitation, housing, medical and hospital facilities, education, recreation, and in many other related conditions essential to social development and public health. The Community Facilities Bill passed by Congress is expected to meet some of the need by providing funds for hospitals, including quarantine or isolation hospitals, clinics, malaria control, schools, recreation buildings, and many miscellaneous items.

In the meantime, upon what should we concentrate from a public health standpoint to achieve the most good with what we have? We cannot hope to tackle all needs, so the logical procedure is to begin with the most urgent and work on down the list, achieving all we can. It is my opinion that the first and most important needs would embrace the following:

1. *Communicable disease control*—with especial reference to the venereal diseases.

2. *Sanitation*—The very elemental phases of health work need more emphasis, particularly ordinary sanitation, safe water and milk supplies, protection of the food supply, sanitary methods of excreta disposal, and drainage.

3. *Industrial hygiene*—With production of tools and equipment being a primary essential to defense, the health of the worker assumes a place of first importance. It must not be neglected.

4. *Rehabilitation*—Based upon the large number of rejectees we have had, which we feel is a good cross-section of the total population, it goes without saying that some action must be begun immediately to boost the physical status of these rejectees where possible.

The lesson that public health gains from the startling discovery that so many are incapacitated for active military service is that mere absence of disease does not imply that one is enjoying maximum physical efficiency and well-being. Consequently, the future will likely see greater emphasis than ever before on promotion and conservation of health as well as prevention of disease. It is time to begin applying on a universal scale the excellent store of knowledge we have been accumulating for some years for practising personal preventive medicine and hygiene. That knowledge, properly recruited, will strengthen immeasurably the nation's defenses. It remains for public health to assume the leadership in putting it to work, instilling in people a greater sense of personal responsibility for health.

The health status of our civilian population as reflected in the large percentage being rejected by the Selective Service boards is of grave concern to public health officials, and we should like to get something done about it. Even though it is impossible to correct the whole situation, 20 to 50 per cent of those involved are considered susceptible of rehabilitation.[1] Last October President Roosevelt indicated to his press conference that a plan is being developed for rehabilitation of the draftees who are classified at the time of their first physical examination as being susceptible of rehabilitation at a reasonable cost in a comparatively short time. To those who were doubtful about the possibility that draftees would

volunteer for rehabilitation or that they could be forced to correct remedial defects, the President responded with some legal opinions as to how such rehabilitation might be compelled once the draftee came under the control of his Selective Service board. Such a program would be largely experimental at first until sufficient evidence has been accumulated to make the process wholly effective. There is a note of hope in the President's proposal which promises some solution to a very complex problem, and which no doubt will exert a helpful influence on the whole civilian population in building physical fitness. The hope remains in spite of the delays which have followed.

The question was advanced at a recent Conference of State and Territorial Health Officers [2] as to whether American public health, within its present framework of organization, is equal to the task of supporting and enhancing military and industrial mobilization and at the same time not seriously depleting the program which has taken years to build. It is apparent that there must be some solution for meeting both civilian and military needs, for if the health of either group lags, the other will ultimately suffer from it. Consider, for example, how much time the soldier spends in territory outside the camp. What will it profit him to have the best of protection in camp if the first time he steps into the surrounding civil communities he contracts some infection which he brings back to menace the rest of the troops? Military public health in the long run, therefore, depends upon the status of civilian public health, and no more important preparation for national defense exists than meeting the health needs of both groups.

We are resolved, therefore, to do the best we can with the personnel and resources available—this in spite of the increasing number of public health problems and the decreasing number of trained workers to fulfil present needs. Dr. Thomas Parran [2] tells us, after making some firsthand observations in England, that—

> If we are to learn anything from the British experience on the medical front, we must reorganize our approach to the problem of medicine's contribution to the defense effort. The medical needs of the civilian population should be considered in all recruitment plans, and should be balanced against the military needs. . . . Medical personnel for military, industrial, and civilian health and medical services should be recruited on a quota basis, having in mind the service which each individual physician can render best. . . . The successful local organization of medical defense effort in Great Britain was possible because for two decades or more Britain has had a nucleus of trained medical officers of health. Without this nucleus, effective local medical defenses could not have been organized. We should take steps promptly to double the number of doctors with training and experience in public health and medical administration. In addition, there should be a comparable increase in public health nurses, sanitary engineers, sanitary inspectors, laboratory technicians, and other technical public health personnel. New training centers will be needed for the training of key persons who in turn will train others who will work under supervision in local communities.

Amid the demands and frustrations of our present crisis, such ideals do not seem possible of early realization. However, I do not believe it is too early to begin looking toward that day when peace shall come upon the earth again, and to make our preparations accordingly. For without doubt, we shall face a world in which many values will be changed, both social and economic, and many new responsibilities will be presented which we must be ready to meet. Public health has met the challenges of past crises, and has through its experiences in them developed new and improved technics which proved beneficial to succeeding generations. Let us hope that when we have emerged from the

present conflict, our contribution to lifesaving methods will have offset in some measure the tragic toll of the battlefield. Since we live in a day of almost revolutionary achievement, I sincerely feel that public health will not be found lacking in the advances which may be made, or in meeting the demands of the future.

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Memorandum Regarding Minimum Educational Facilities Necessary for the Postgraduate Education of Those Seeking Careers in Public Health*

IN view of the confusion which exists regarding facilities necessary for the proper education of professional public health personnel it seems timely for the Committee on Professional Education to state its present opinion. For the benefit of appointing bodies, teaching institutions, and candidates for a professional career in public health, the committee here sets forth what it believes to be the minimum facilities necessary for the adequate training of professional workers. It is subject to change and elaboration as experience accumulates.

I

Since public health itself is a specialty, all professional service in public health requires special education over and above the training inherent in the profession from which the candidate comes. For example: a physician entering the field of public health, already fully trained in clinical medicine, must also acquire competence in public health administration, epidemiology, vital statistics, community organization, etc.

II

To their great credit many present and past public health leaders obtained their training largely by experience. We recognize their attainments and acknowledge our indebtedness for their pioneer accomplishments. Nevertheless, (a) with today's rapidly accumulating knowledge, (b) with the increased legal, social, and economic responsibilities of the public health profession, and (c) with the development of many superior teaching institutions, we believe special professional training in public health is best obtained at a well equipped teaching institution. Such training should be at the graduate level, that is, after earning the professional degree.

III

Special professional training for a public health career should include:

1. Skilled, organized, well integrated instruction, including laboratory exercises, under a variety of teachers who are recognized leaders in their respective fields, including a central group of those who devote full time to the teaching of public health.
2. Supervised field observation and experience in one or more well organized official or voluntary health agencies.

IV

1. There is great advantage in obtaining this special training in a teaching institution having immediate access to and coöperative assistance from the faculties of schools of the medical and biological sciences, engineering, education, social and political science, economics and business administration. While not all professional public health personnel need full

* Adopted by the Committee on Professional Education of the American Public Health Association, April 17, 1942.

competence in all these broad fields, some will need considerable familiarity with several of them.

2. It is essential that the institution essaying to train professional public health personnel at the graduate level have a good library for reference work and ample laboratory facilities where students may have adequate space and apparatus to develop skills in such fields as bacteriology, engineering, statistics, and the like.
3. It is likewise essential that such an institution have access to well organized health departments and voluntary health agencies which are willing to assist the school by providing facilities for supervised field training and experience. The performance standards of these agencies should be satisfactory to the school and their procedures familiar enough to the school so that its teaching methods may be correlated with the student's observation.
4. There is considerable advantage in having all necessary facilities for training all types of professional public health personnel in the same institution so that they may participate together in certain basic courses.

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THE PUBLIC HEALTH ADMINISTRATOR AND THE WAR

AS the strategy and economy of war develops, all local, personal, and group interests must give way to the national needs. This is a hard lesson to learn. To many it is distressing even to entertain such a thought. Faced with the oncoming shadow of deprivation and sacrifice, one is inclined to expostulate and remonstrate, fearing perhaps that if he does not do this his rights will be more adversely affected than will be the case with those who cry to high Heaven. One is naturally appalled, too, to find threatened the things to which he has given his life. But this threat to things is not nearly so serious as is the threat to life and soul; and the latter threat is essentially the one which each man and woman in every walk of life today faces: an inexorable and universal threat that all must meet. One may meet it in good spirit, courageously, and generously, to the benefit of his country and the glory of his own soul; or he may acquiesce half-heartedly, grudgingly, and stubbornly, to the jeopardy of the nation and his own deserved and final self-damnation.

How does all this relate to public health? Well, for the past year and a half there has been much speculation as to how war would affect (1) the public health, (2) public health work, (3) public health workers, and (4) the recruitment of new personnel. Actually, from a broad national standpoint, the first consideration is the only one of real importance, for in comparison with the necessity of maintaining the public health, the *way* in which this is done, by *whom* it is done, and the personal fortunes and comforts of those at present engaged in public health work fade into insignificance. While this philosophy has by now been generally accepted by those responsible for the public health, some have not yet reached the articulate and action stage. That this is the case was evidenced in the proceedings of a recent conference on public health and the war. This was attended by many public health administrators. In the early stages of the discussion, perhaps for the greater part of it, those present seemed to be chiefly concerned with how in the face of military demands they might maintain their staffs intact or nearly so. Beyond a doubt many of them had sustained grievous losses in personnel, and their evidence of distress was received with due sympathy. But

the conference seemed to get nowhere. The members were restless. One sensed that, while they regarded as serious this draining off of trained workers and the inability to replace them with similarly trained personnel, they felt it to be only one part of a situation which badly needed to be discussed from a broader standpoint. And then, amazingly, the air was cleared by two or three speakers who took an entirely new tack. They called attention to the fact that there is a war on, that in pursuing this war, and in spite of the morale-designed emphasis on the importance of civilian defense, armed forces after all play a part of some importance; that for the man power of these armed forces there must inevitably be a bottom-of-the-barrel scraping of physically fit individuals under 45 years of age; and that in these circumstances it becomes the duty and privilege of public health administrators so to shape their organizations and so to bend their programs as to yield generously, and even completely to the armed forces those on health department staffs who are competent, and fit, to serve in a military capacity. These speakers went on further to point out that the responsibilities of public health administrators were not to keep their staffs intact, but to maintain the health of the public regardless of the shortage of already trained personnel they might have to face today or tomorrow.

It was heartening to witness the responses to these perfectly clear-cut, logical, and realistic suggestions. Many of those present seemed for the first time to realize that in this emergency public health work *could* and *must* be carried on by older men, by men not necessarily completely robust, by women; that, in contrast, active, rough-and-tumble military duty can be sustained only by the young and hardy. These administrators were realists enough, too, to appreciate that in numbers, the under 45 years of age and physically fit individuals are necessarily limited; and on the basis of their experience they were quick to see that, just as in a budget, disaster invariably follows when a number of executives are drawing on the same item, so only one authority may wisely draw upon or hold in reserve the physically fit professional group in public health. In most instances, the authority so to draw must rest with the Procurement and Assignment Service, which in this field is the agency officially designated to meet the needs of the Army and Navy Medical Corps, and of civilian populations.

Generally then, it may be said that public health administrators are adjusting to meet the new demands. As the situation becomes more sharply defined, two things stand out clearly. The first is that the military services must have prior claim on public health's tough and active workers, and the second, that the problem which administrators in this field face is not to preserve public health organizations and staffs as they were, but to maintain the public health in spite of inadequacy in personnel. And they will do this. Public health officers are not themselves so far spent that they are unable to stoop and rebuild, even though it must be done with untempered and sometimes worn tools.

AN ADOLESCENT GIANT STIRS

UNDER a release date of March 30, the United States Public Health Service announced that a three day conference on the conservation of man power in war industries would be held in Washington, April 9 to 11. This announcement went on to state that "Even in normal times, 400,000,000 man-days are lost annually in industry because of sickness and accidents. A large part

of this wastage can be prevented. Representatives of the medical profession, governmental industrial hygiene services, management, and labor will participate in the discussion of ways and means to reduce industrial disability."

The meeting in question was held last month, so it is no longer news. It is nevertheless significant, for such an approach to the problems and practice of industrial hygiene is a far cry from the old factory's dingy first aid dispensary. A comprehensive attack like this is quite different, too, from the situation which existed in industrial hygiene when the most stable of its personnel was the small town "railroad surgeon," not always chosen for his skill, whose principal duty was an occasional amputation and whose retaining fee was a railroad pass for self—and for family, if possible.

Today, not only are the problems in industrial hygiene far more extensive in their range and more complex in their make-up than formerly, but practice in this field demands quite a different type of individual. In fact, to meet the needs, there must be a staff of experts rather than one person. The medical man on such a staff is far more concerned with placement-employment and with prevention of disease and disability than with salvage after accident or disaster. He must be detailedly informed as to manufacturing processes and alert as to their potential dangers to the workers employed. This industrial physician, too, must be a good enough practical psychologist to know the limits in precautions which human beings are likely to observe under stress of monotony and fatigue, and the physical and mental demands of the various jobs. Not only must he be a good clinician, but a pre-clinician as well if he is to discover trouble in its incipiency. And finally, he must be able to interpret both to management and to labor the dollar and cents value of the money and effort spent.

Medical measures, though extremely important in industrial hygiene, do not by any means occupy the entire field. Engineering work is vital in lighting, heating, ordinary ventilation, and in air conditioning and removal of dust and fumes; in the guarding of dangerous moving parts of machinery, in the provision of adequate washing and toilet facilities and their placement, even in the character of flooring and the kind and time of cleaning done. The chemist also plays an extremely important rôle in making safe the handling of toxic or irritating materials or in finding substitutes for them, and the physiologist is much concerned with questions related to fatigue, varying pressures, lights and temperatures, and tolerances of one sort or another. The interest and coöperation of employers is essential too, if industrial hygiene services are to be organized and maintained, and understanding, appreciation, and support, on the part of labor must be insured.

It is easy to see that in this field there has been a bursting of old bounds. New qualities and new quantities, and new problems and new practices have arisen. Industrial hygiene no longer limits itself to preëmployment examinations and first aid. Instead, it relates to all those measures, procedures, and precautions which are designed to make reasonably safe the working conditions of those in industry and which contribute directly or indirectly to the maintenance of the workers' health and efficiency.

Credit Lines

A Selective Digest of Diversified Health Interests

D. B. Armstrong, M.D., and John Lentz, M.S.

AN EDITORIALETTE:

ALWAYS AND NEVER

"The trouble with medical training is that it is too individualistic and ultra-conservative"—a criticism heard not infrequently, especially at this time, with the broad trend toward socialization of all types of services, now to be materially accelerated by the war. Presumably medical organization should and will be adapted so as to make possible a greater social use of medical services, though it is profoundly to be hoped that its basic anchorage in the traditions of private medical practice will not be completely sacrificed.

Always, if there are to be real doctors of medicine, the study of disease must be highly individualized. It is people as individuals who are sick with human pathology. They must be treated and cured individually, and, now that personal hygiene is superimposed upon public sanitation, their diseases must also largely be prevented individually.

The medical student of human diseases finds an infinite variety of manifestations, and few if any hard and fast rules. The signs and symptoms with which he must become familiar are not statistically as classifiable as are births and deaths. Those who deal with more tangible facts and figures seem to the doctor a little too facile in drawing conclusions from medical data. The average, well trained doctor of medicine sometimes feels that if he could be as sure of *any one thing* in medicine as some of his non-clinical colleagues are regarding *everything in medicine*, he would be a most fortunate doctor indeed.

Then, too, the doctor finds ideas and opinions in his art changing a little too rapidly to validate the concept of fixed and incontrovertible facts in medicine. He remembers, for instance, the recent history of poliomyelitis. He remembers back in 1912 when flies were definitely identified with the transmission of this disease. He recollects that this idea was unconfirmed and rather completely repudiated, now to come back strongly into the poliomyelitis epidemiological picture. He remembers when poliomyelitis virus vaccines were enthusiastically applauded, and then discarded. He readily remembers the ups and downs of nasal chemical blocking—over-exploited by lay writers in the popular medical science field. He recollects when the respiratory tract was considered by nearly all scientists as the one channel of entry of the poliomyelitis virus. Despised and spurned were those few crying in the wilderness about the importance of the gastrointestinal tract, which now comes very much into the limelight. Finally, he hears of the traditional and universal therapeutic splints being discarded for a hitherto unheard of but widely acclaimed physiotherapy.

From this it would appear that a degree of skeptical pessimism in medicine is a rather healthy state, out of which the physician must from time to time be shaken, if he is to participate in and contribute to organized medical and preventive medical progress—a dislodgment usually accomplished by the more

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optimistic social promoter or health educator. Yet there seem to be in medicine few if any "eternal truths," and perhaps only succeeding facets of the evolving and growing body of knowledge. To some men in clinical medicine all this must frequently refresh their memories of their professor of medicine, who was accustomed to orient his class at the beginning of his lecture series by admonishing the embryo physicians that "there are two words that do *not* appear in the vocabulary of medicine—*always* and *never*."

(Editorial Note: Third and last call! Won't you help us continue this series of "editorialettes"? There must be many subjects in the field of health education upon which you would like to express an opinion. Let us have your thoughts on any of these subjects. You may praise, criticise, or philosophize—provided it is done in not more than a hundred words. While we cannot guarantee publication, serious consideration will be given to your contribution.)

DISSENTING OPINION

Since the government embarked on its ambitious program to induce Americans to eat their way to health, we have had an opportunity to examine much of the literature and other publicity material which certain federal agencies, health organizations, and commercial enterprises have issued for popular consumption. We find that, with few exceptions, these materials are not sufficiently convincing or appealing to arouse Mr. and Mrs. John Q. Public to the importance of good nutrition. We have tried our hand at it and are ready to admit that nutrition is a difficult subject to publicize. Just why our efforts to date have been singularly lacking in popular appeal is anybody's guess. Perhaps we have yet to find the proper popular approach which the advertising specialist calls "the selling angle."

We wonder how the average person reacts to the nutrition literature that is handed out here, there and yonder. Surely much of this material is read and the advice in it followed. On the other hand, a great deal of it must be cast into the nearest wastebasket. And we hardly blame the recipients. At this point, many people are "fed up" with nutrition (if we may turn a phrase!). And why not? The nutrition messages stem from so many sources and so many products are "plugged" as having outstanding nutritive values that we suspect a large proportion of the public is beginning to look upon the educational program as akin to a great sales-promotion venture. To add to the confusion, we are told by one authority in the field of nutrition that much of the so-called educational material now in circulation actually contains misleading information.

It would be too bad if this campaign missed the mark. Public health workers have demonstrated that they can perform a task of this nature magnificently—as evidenced by the nation-wide syphilis campaign. But the nutrition program, like Stephen Leacock's horse, seems to be "running off in all directions." As one authority sums it up: "Everyone is a nutrition specialist these days."

Now is the time to vitalize this campaign through the distribution of more effective educational literature sponsored by or endorsed by recognized scientific agencies. There is no place in this program for the flood of handouts obviously designed to promote the sale of certain food products. Any original and appealing ideas that will help "put over" the nutrition message will be welcomed and duly broadcast in these columns.

If you do not agree with the observations made here—speak up. We welcome rebuttal.

FILM NOTES

"Tuberculosis is sand in the gears of democracy's victory machine." Upon

this theme the National Tuberculosis Association has fashioned a new motion picture that is entertaining, instructive, and keyed to the stirring enterprise of winning the war. The picture is entitled, appropriately enough, "Sand in the Gears." It is an unusually good film which moves from beginning to end with the brisk tempo of a newsreel. Its timely message, lively pace, interesting photography, narration, and music make this a picture that all types of audiences will welcome.

"Sand in the Gears" pictures America as a great industrial giant whose future depends upon "three musketeers—the soldier, the sailor, and the laborer." The film stresses the fact that tuberculosis can easily sabotage our war effort as the heightened tempo of wartime industry is especially conducive to the spread of this disease. The resources which are available to combat tuberculosis are described and the audience is left with the feeling that we are well armed to carry out the fight against this ancient enemy.

One could criticise the film on only two counts: (1) Relatively too much emphasis seems to be placed on public facilities for tuberculosis control, with little or no reference being made to the rôle of the private practitioner, and (2) no mention is made of the growing tendency to employ women in war industries—a fact that will certainly have a bearing on the tuberculosis problem.

"Sand in the Gears" may be obtained from state or local tuberculosis associations or from the National Tuberculosis Association, 1790 Broadway, New York, N. Y. Tell your local theater manager about this picture. It has sufficient audience appeal to warrant its use on any theater program.

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A set of seven silent film strips has been issued by the Metropolitan Life Insurance Company to accompany the booklets which make up the company's Health Heroes Series, a group of seven biographies of prominent physicians and scientists. The film strips of the Health Heroes Series have recently been thoroughly revised. New scripts were prepared for each, with the advice and coöperation of various public health and educational leaders. The film strips are illustrated with authenic pictorial material gathered from notable collections in medical libraries, archives, and from other sources. While the strips are produced primarily for schools, they are also suitable for adult audiences. The series includes the following titles:

Madame Curie and the Story of Radium—This interpretation of Madame Curie's life, her devotion to scientific research, and her achievements is particularly appropriate for use in cancer control programs.

Edward Jenner and the Story of Smallpox Vaccination—The life of the great physician who discovered smallpox vaccination is portrayed against a background of contemporary events and personalities.

Robert Koch and the Discovery of the Tubercle Bacillus—Koch is presented as the young naturalist who became the father of bacteriology and opened a new era in public health.

Florence Nightingale and the Founding of Professional Nursing—The dramatic story of the first great nurse and her influence upon the profession turns modern at the end with a series of pictures depicting the variety of nursing careers open to young women today.

Louis Pasteur and the Germ Theory of Infection—The glory of scientific achievement is felt throughout this brief but inspiring story of the great scientist's life.

Walter Reed and the Conquest of Yellow Fever—The history of Walter Reed and his gallant helpers who led the attack upon yellow fever is, as its opening title claims, a great detective story.

Edward Livingston Trudeau and the

Crusade Against Tuberculosis—In this film, Trudeau's life story merges with the story of public health's great triumph over tuberculosis.

The film strips come in 35 mm. size and may be used in a delineascope or other slide projector equipped with a special attachment designed for running film strips. They are given without charge, upon request, as a permanent addition to film libraries of health, nursing, and educational organizations. Write to the Welfare Division, Metropolitan Life Insurance Company, 1 Madison Ave., New York, N. Y., for prints.

RECENT HEALTH PUBLICATIONS

You will want to see . . .

The Nebraska Health Almanac for 1942. Almanacs and mail order catalogs have always held a peculiar fascination for the public. Little wonder then that the Nebraska State Department of Health saw fit to issue a health publication designed—as was occasionally done years ago—along the familiar lines of an almanac. It is our belief that this publication will be widely used by the citizens of Nebraska and that at the year's end, copies will be as well thumbed and dog-eared as once was the family almanac. The publication is well stocked with current public health information and in addition contains a great deal of historical material. (Incidentally, we were amused by one typographical error in the Almanac which reads: "Wednesday, April 8, 1869, Harvey Cushing, pioneer *train* surgeon was born.") The Almanac is delightfully old-fashioned in appearance and up-to-the-minute in educational content. Write to the Nebraska State Department of Health at Lincoln for copies.

Annual Reports and How to Improve Them. The Social Work Publicity Council, 130 East 22nd Street, New York, N. Y., in announcing this publication states: "Here's your inoculation against annual report fever—here's your special treatment to prevent frayed nerves when annual reports are being prepared." We agree that this excellent guide, from the knowing pen of Mary Swain Routzahn, is "just what the doctor ordered" for all those who struggle with annual reports. This 20 page guide offers a wealth of information on how to make a report interpretative, readable, informal, and attractive. Of special interest is the fact that it tells how to produce inexpensive annual statements. Mrs. Routzahn discusses annual reports from widely differing fields of public service, in the hope that such "case histories" might be helpful to report-writers in improving their own work. This excellent publication may be secured from the Council for the slight consideration of *50 cents.*

Why Does Tuberculosis Run in the Family? The National Tuberculosis Association is distributing a new publication with this title. It was written by H. E. Kleinschmidt, M.D., the Association's Director of Health Education. For a discussion of the factors of heredity and resistance, measured against environment and exposure, this statement by Dr. Kleinschmidt, designed for the interest of the intelligent lay reader, excels anything we have seen in this field in clarity, simplicity, and intelligibility. Sections in the pamphlet, dealing particularly with home infection hazards, are especially commendable. The publication is highly recommended for welfare workers, nurses, teachers, and others. Consult your state or local tuberculosis association for copies.

All Eyes! This is the title of the twenty-seventh annual report of the National Society for the Prevention of Blindness, Inc. Year in and year out this organization issues annual reports that are distinguished by their neatness, compactness, easy readability, and photographs that rivet one's attention. The 1941 report is prefaced by a thoughtful

and timely foreword in which the society's president, Mason H. Bigelow, stresses the importance of good eyesight to our present military and industrial effort. The body of the report is devoted to a resume of the year's work which reflects, as always, an admirable record of service. This is the type of report one wishes to file and keep, so well is it executed. Write to the Society at 1790 Broadway, New York, N. Y., for copies.

HEALTH—You Owe It to Yourself, a leaflet issued by the Council of Social Agencies of the District of Columbia, 1101 M Street, N.W., Washington. This publication is planned for distribution to rejected draftees. Its contents will be extremely helpful and encouraging to young men who feel that rejection renders them useless for any type of war work. Specific directions are given in the leaflet regarding those agencies in the community that are available for the treatment of diseases and the correction of defects. A publication of this nature could be used to great advantage in all communities. If interested, write to the agency mentioned above for a copy.

What Is Heart Disease? This folder, issued by the California Heart Association, 277 Pine Street, San Francisco, is decidedly "flashy" and modernistic. In fact, one might wish that a little less novel presentation had been used by the association to inform the public of its program. Yet the text of the folder is well written and attractively illustrated with stylized drawings. While we do not "go" for too much modernism in health literature, we grant that this particular publication will stand out from the general run of health pamphlets and will therefore be popular with the public. We like the slogan which this folder carries: "Heart disease over forty—It may be weight—not fate!" Copies may be had by writing the organization at the address given above.

Prostitution and the War, Public Affairs Pamphlet No. 65, by Philip S. Broughton. Here is a complete and thorough-going analysis of the rising problem of prostitution on both the home and fighting fronts. "We can't afford the germs of syphilis and gonorrhea any more than we can afford the less deadly human saboteur," says Mr. Broughton. In this 30-odd page pamphlet, the author makes it abundantly clear why no sane community can allow the modern prostitution racket to keep a foothold within its borders. The pamphlet contains some interesting descriptive material on social conditions that have grown up in industrial centers. It also outlines the work of public agencies that are concerned with the control of venereal diseases. A notable feature of this study is the author's sane viewpoint toward prostitution. He maintains that "prostitutes are people" who, if handled with skill and understanding, can be rehabilitated. Stamping out prostitution is a broad community enterprise and Mr. Broughton calls upon all the public, voluntary, and private community services to help do the job. This excellent study has substance without preachment and moralizing. *Prostitution and the War* may be obtained at *10 cents* per copy by writing to the Public Affairs Committee, 30 Rockefeller Plaza, New York, N. Y.

"IT'S AS SIMPLE AS THAT—"

Breathes there a health educator who has not spent hours staring into empty space while trying to reduce to simple terms the pontifical utterances of the experts? We admire the scientists' capacity to observe and record, but one could wish that their observations and deductions were expressed more frequently in clear, simple language.

As a simplifier of ponderous phraseology, President Roosevelt is a master. He clearly demonstrated this ability recently when a government official

wrote a letter on the subject of blacking out federal buildings during air raids. The letter, bristling with polysyllabic profundities, stated:

"Such preparation shall be made as will completely obscure all buildings occupied by the Federal Government during an air raid for any period of time from visibility by reason of internal or external illumination. Such obscuration may be obtained either by blackout construction or by termination of the illumination."

Upon reading this, the Chief Executive ordered a re-write job. "Tell them," he said, "that in buildings where they have to keep the work going, to put something across the window. In buildings where they can afford to let work stop for awhile, turn out the lights."

Here is a lesson in simplification which is well worth the study of every health educator—and here also is one example of why our President is so well understood by the general public.

ARE YOU AN AUDIENCE ENEMY?

Although the A.P.H.A.'s Annual Convention is not scheduled until October, there are probably many prospective speakers who are already at work on papers and addresses to be delivered at the 1942 meeting. Naturally every person who is to appear on the program wants to put his or her best foot forward —so we pass on to you certain helpful excerpts from an article by Dr. Eugene F. DuBois entitled "Audience Enemies" and published in *Science*, issue of March 13, 1942.

Dr. DuBois lists six audience enemies whose minor and major defects are best calculated to torture a scientific assemblage. Heading the list of audience enemies is The Mumbler, who drops his voice to emphasize important points or else talks to the lantern screen instead of the audience. He is apparently more interested in excreting words than in conveying information. The Slide Crowder comes next. He packs his slides with typewritten data and shows too many slides, as if to demonstrate his industry. He also wields a pointer or employs a flashlight that projects an arrow that swoops and darts all over the screen and ceiling like a hornet. A good slide—carefully drawn in India ink and stripped of all nonessential words and figures —needs no pointer-wielder. Then there is The Time Ignorer, who talks beyond the limit specified in the program or justified by common courtesy. He is evidently over-impressed with the idea that his paper is much more important than the program committee had imagined. Occupying fourth place is The Sloppy Arranger, who jumbles his material in a way best calculated to confuse the audience. He may have in the back of his head the idea that he can lead up to a climax and hold the audience in breathless suspense until in the very last sentence he can prove that the venous blood of the wimpus contains only 3 milligrams of gadgetyl chloride instead of 4 milligrams. Would it not be kinder to the audience if he followed newspaper technic and gave in a headline, early in the talk, some idea as to what and wherefore? Audience enemy number five is The Lean Producer whose paper consists of trivia, errata, omissia, et cetera; mostly et cetera. Last on the list is The Grasping Discusser, who can spoil almost any meeting. If he has been invited to open the discussion he has probably prepared a nice little paper of his own with scant reference to the paper upon which he was supposed to comment.

It is suggested by Dr. DuBois that the chairman of a meeting can do a great deal to protect the audience against these enemies—and he proposes that the chairman be given a new title: "Sole Protector of the Audience."

Speakers themselves can do much to perfect their technic of delivery by

pondering this list of audience enemies long before they mount the platform.

MAGAZINE ARTICLES

Recent popular magazine articles on health or of medical import:

"What Medical Specialists Do." (A chart compiled by medical authorities.) *Good Housekeeping Magazine*, April, 1942.

"Do You Want to Be a Nurse?" Dorothy Dunbar Bromley. *Good Housekeeping Magazine*, March, 1942.

"Women Without Men." Maxine Davis. *Good Housekeeping Magazine*, March, 1942.

"Health for Young America." Thomas Parran, M.D. *Parent's Magazine*, March, 1942.

"Headaches Are a Luxury." Helen Furnas. *Coronet Magazine*, March, 1942.

"How to Dodge a Cold—or Lick One." Lois Mattox Miller. *Better Homes and Gardens*, March, 1942.

"A Dozen Don'ts That Save Lives." Charles B. Scully. *Better Homes and Gardens*, March, 1942.

"Do You Really Know What to Eat?" Paul de Kruif. *The Reader's Digest*, April, 1942.

"Germ Killers from the Earth: The Story of Gramicidin." John Pfeiffer. *Harper's Magazine*, March, 1942.

"The Fight Against T. B." Louise Fox Connell. *You Magazine* (Spring issue), 1942.

"Advice to Pregnant Husbands." Eileen Wilson. *Coronet Magazine*, April, 1942.

(The above is not presented as a complete list and the articles cited are not necessarily recommended.)

FOR SAFER HOMES AND FARMS

The National Safety Council recently held a special conference in Chicago on farm and home safety. The meeting was called in recognition of the increasing gravity of accidents in these fields generally, and also because of the importance of home and farm accident prevention in the present national war emergency.

Of special interest to workers in the public health field was the recognition, at this conference, of the part that can and should be played by health departments, nursing agencies, and similar professional health groups in studying home accident factors, and in exercising preventive measures. Reports were presented indicating the importance of nursing contacts in the home and the use of personal hygiene educational technics, as developed by health departments, in the control of home hazards.

It is also significant to note that the American Public Health Association, the New York State Department of Health, and other health agencies were officially represented at this conference. Plans were perfected for an emergency program, aimed at accident control, especially for smaller communities and rural areas where full-fledged safety movements with paid executives are not practicable. The National Safety Council recognized its responsibility in enlisting the coöperation and aid of numerous agencies able to contribute to the solution of this problem, including the Boy Scouts, the Girl Scouts, the Red Cross, Chambers of Commerce, Departments of Agriculture, and the like. To an increasing extent it may be expected that health agencies, official and voluntary, will be called upon to participate more actively in education as to home and farm safety.

In fact, the New York State Department of Health has already taken initial steps toward the development of an educational program to combat such accidents. At a recent conference held in Albany, representatives of practically all official and voluntary agencies of the state concerned with accidents, agreed that a program should be worked out.

Public health nurses are to play an important part in the proposed educational campaign.

JOTTINGS

The *New York Times* recently commented on the growing tendency of factory managers to distribute vitamin pills to workers. The paper, after deploring "the vitamin craze" in general, remarked that "the nutrition expert should determine when vitamins are to be administered—not a well-meaning, but uninformed, factory manager." . . . Watch for the appearance of "Vital Victor," a cartoon character that may become the symbol of good nutrition. His body is constructed of various food products. He is a rather ingenious little fellow and will probably catch the public's fancy. . . . A quotation from *The Lancet*, the British medical journal: "Two sorts of scientists speak from public platforms: those who think they have something to say and those who think they have to say something." . . . If optimum health and cleanliness go hand in hand, then there's comfort in knowing that last year the 76 members of the Association of Soap Producers, representing about 40 per cent of the nation's production, had sales amounting to $326,133,270! . . . It is predicted that as cuffs disappear from men's trousers, the number of injuries due to falls will sharply decline. In the thirty-odd years that cuffs have been fashionable they accounted, it is believed, for 93 per cent of all male falls downstairs, including 52 per cent for which Demon Rum got the blame. . . . Two recent books that are all well worth reading: (1) *The Men Who Make the Future*, by Bruce Bliven, and (2) *Science Year Book of 1942*, by J. D. Ratcliff. Mr. Bliven's book is an engrossing account of the amazing scientific discoveries that are now taking place in medicine, surgery, chemistry, and other fields. Mr. Ratcliff's book is a straightforward summary of scientific advances in the past year, written in the author's usual lively style. . . . Do you enjoy a literary adventure now and then? If so, read "Soliloquy to Balance the Budget," a radio play by Norman Corwin. We recommend it here particularly because of Corwin's masterful description of the human brain and its functions. The play is found in a collection of radio dramas published by Henry Holt and Company under the title "Thirteen by Corwin." . . . If there are any readers of this section of the JOURNAL who have not yet seen the "Fitness for Freedom" issue of *Survey Graphic* (published in March), we suggest securing a copy. This excellent number was planned "to spread the gospel of health" and no public health worker should miss it. Much of the material in this special issue could be used advantageously in preparing speeches for the general public. . . . One of the country's leading poster artists says: "The poster field is a very special one and involves difficulties and problems unlike those encountered in other art forms. So much depends on terseness and absolute clearness. Ideas must be instantly communicated or they are likely not to get across at all. The poster must be designed to be read by him who runs. Thus it becomes a matter of presenting a single idea with such arresting forcefulness that a mere swift glance on the part of the spectator suffices. When a poster fulfils these requisites, it rings the bell." . . . Quotation from Grace T. Hallock: "The final stages of a campaign against a disease are always the hardest because enthusiasm wanes when a cause is almost won. If we forget what an ebbing menace was like when it was at the flood, we may neglect the precautions which will keep it from rising once again. Perhaps that is one of the chief services of history—to keep a memory green until a task is done."

BOOKS AND REPORTS

Handbook for Civilian Defense—*By H. Mayer-Daxlanden. New York: Civilian Advisory Service* (41 Park Row), 1941. 88 pp. Price, $1.00.

In a preface the author of this timely handbook tells us he came to its writing "consumed with apprehension" after studying civil defense in Europe and nearly 20 years of publishing on industrial hygiene and accident prevention. His handbook is an elementary one, almost devoid of technical language and designed in good spirit to assist the novice who volunteers as a civilian defense worker in these days of potential blitz warfare on the home front.

Almost at once the text jumps into the matter of incendiary bombs and fire control, and from there rather abruptly to the air raid warden service, and thence in a series of loosely connected paragraphs it covers about all of the recognized civil defense activities, or, as the British would have it, Air Raid Precautions (ARP) services. Nearly 20 of the 88 pages are devoted to chemical or gas warfare from the civilian viewpoint, and who can tell whether this is too great emphasis? In the air raid warden portion we find an essential doctrine set forth that is gradually gaining adequate acceptance in the United States, namely that *all* civil defense personnel should have theoretical training, followed by practical drilling in the field in order to establish familiarity with vital duties through practice. "Each service must have its own detailed instruction but an air raid warden must understand the basic principles of all the work."

Air raid warnings, control and report centers, shelters, first aid posts and medical services, rest and feeding and nutritional branches of civil defense, and a host of allied welfare responsibilities—these fill the short and longer paragraphs in a rather disjointed manner in the handbook which at first disappoints by its lack of order and balance in the discussion of the various topics. In the end, however, the reading has been stimulating and should lead to a desire to know thoroughly the first text in the bibliography, that best American reference *Civil Air Defense*, by A. M. Prentiss, Lt. Colonel, U. S. Army. In this connection, mention should perhaps be made of the more recent publications of the U. S. Office of Civilian Defense, the *Handbooks, Textbooks, Planning and Training Guides,* and *Bulletins* which can be secured by the interested civilian through his local defense council, and of the British Library of Information, 30 Rockefeller Plaza, New York, N. Y., which is the American source for all official British publications including ARP and the related Emergency Medical Services. And, finally, no one should miss John Strachey's classic eye and ear-witness description of the London blitzes he went through as a warden, entitled "Digging for Mrs. Miller." HUNTINGTON WILLIAMS

Behind the Mask of Medicine—*By Miles Atkinson. New York: Scribner,* 1941. 348 pp. Price, $3.00.

This is not just another book. The author says that it is not easy to explain in a few words the idea he had in writing it, but that it "represents an attempt to find out where and how we have gone wrong." He believes that we have gone wrong in more ways than one.

The twelve chapters are systemati-

cally arranged, and contain a wealth of information, much of which is intended for the public, but all of which should be better known to the medical profession than is the case. He glories in the achievements of the medical profession but does not hesitate to point out its weaknesses. He emphasizes the social side of medicine and declares that it is not only a social science, but "perhaps the most important of them all." He follows the historical method, believing that a study of the past provides our only safe guide for the future.

The phenomenal progress made during the last hundred years has come like "a thunderbolt of knowledge which knocked away the props that had stood for two thousand years and more." We have not had time to digest what has come to us, and medicine, like the rest of the world, is in something of a turmoil. The author emphasizes reverence for the profession, its accomplishments, standards, and aims, holding that without the knowledge we owe to medical science we would revert inevitably to the darkness of the Middle Ages. As a basis for this belief the first two chapters are devoted to history and are well done. Later chapters speak of the problems which the doctor is constantly up against, beginning with diagnosis. As presented, they constitute really a study of human nature as the doctor sees it in practice. This necessarily brings in the fads and follies, for some of which the doctor is responsible, such as too much specialism, excesses in surgery, quacks, fee-splitting, etc.

The discussion of euthanasia which comes in the chapter "The Art of Prophecy" (prognosis) is one of the best. The chapter, "Tradition in Medicine" is striking. As a graduate of "Barts," the only hospital remaining within the boundaries of the old city walls of London, the author naturally turns to the tradition of that hospital as an outstanding example, and says that no member of the staff ever violates it and puts private practice before the hospital. He says, "It is in my blood. That is the way with tradition."

The author deplores most of the trends of modern medicine, attributing them to the machine age, which though producing better end results, has done great damage to the physician. He insists that nothing can take the place of the old physician, the personal diagnosis arrived at by careful observation, and the comfort given the patient, even when the outlook is the worst. One can often tell as much with a trained finger—"tactus eruditus" of the old school—as with an electric gadget. To illustrate this point, he tells the story of Sir James McKenzie, who as a busy general practitioner among poor patients and with the simplest of equipment, founded modern cardiology. To his dying day he maintained the advantage of clinical methods over the machine.

The book ends with a forecast which is pessimistic, though the author denies it, and calls himself an optimist. While he believes that our present civilization ended in June, 1940, with the "fall of France and the end of the amazing century," he holds that even if our present civilization dies it has left a record of great strides in the 600 years of its life, and will hand to the next civilization "a tradition of scholarship worthy of that which Greece and Rome bequeathed to it. . . . Medicine may even prove to be the link that will join the old age to the new."

A historical error is found on page 28, where the discovery of the agency of the mosquito in the transmission of yellow fever is attributed to General Gorgas instead of to Walter Reed. General Gorgas was not connected with the Commission, directly or indirectly, and in fact was very slow to accept its findings.

It is hard to speak too highly of this book. Unquestionably there will be disagreement with some of the statements made and grounds taken, but on the whole the author inculcates the highest standards of conduct under every circumstance which may confront the doctor either as a physician or man. We hope for the book a wide reading, not only among the laity but among doctors, especially those entering practice. MAZŸCK P. RAVENEL

Modern Sanitary Engineering—*By G. Eric Mitchell. Brooklyn, N. Y.: Chemical Publishing Co.*, 1942. 166 pp., diagrams, tables. Price, $5.00.

A presentation of current British practice in the drainage and sanitation, ventilating, and heating of buildings from foundation to completion, and water supply. Although of use to municipal surveyors and architects, the entire field of sanitary engineering as usually treated in American books is not covered. Plumbing is discussed at some length as are British by-laws with respect to water supply.

ARTHUR P. MILLER

The Essentials of Occupational Diseases—*By Jewett V. Reed and A. K. Harcourt. Indianapolis: Thomas*, 1941. 225 pp. Price, $3.00.

The necessity for the maintenance of man power in the present war emergency makes a volume on the subject of the occupational diseases very timely. In fact, the American literature has been sorely deficient in this respect for many years.

The present volume is very logically arranged and includes sections on poisons, physical agents, skin lesions, pulmonary occupational diseases, occupational malignant diseases, occupational infection, and functional disturbances associated with occupation. Judged by the table of contents, the present volume must be considered very satisfactory. It is, however, a small book, 225 pages in all, including the bibliography and index, and because of the large field which it covers the presentation of each individual subject is exceedingly brief. For example, 79 chemical poisons are discussed in 100 text pages. It is easy to see that each individual poison must of necessity receive very scant treatment, so scant, in fact, that the volume must be considered as having a very limited field of usefulness. This same criticism is valid throughout the whole of the volume. The prevention of the occupational diseases receives no consideration.

The volume closes with a satisfactory pertinent bibliography of 15 pages.

LEONARD GREENBURG

Treatment of the Patient Past Fifty—*By Ernst P. Boas, M.D. Chicago: Year Book Publishers*, 1941. 324 pp. Price, $4.00.

The author discusses those diseases (mostly chronic and mostly those of the cardiovascular-renal system) which predominate in elderly people, giving sound observations based upon his own extensive clinical experience. He furthermore elaborates, wherever possible, upon the different clinical picture or the different treatment needed with elderly patients as contrasted with younger patients suffering from the same diseases. In this he is limited by the inadequacy of our present information on aging rather than by any unfamiliarity with the literature. A chapter is given to the " general management of the aging and aged person." Dr. Boas distinguishes between aging and pathological processes but seems to assume that only the latter offer hope of control.

The book is for the practising physician. It points out that " the physician tends to minimize the importance of a routine health examination." A chapter is then given to general diagnosis and

treatment of the aged. It is not intended as a textbook or as a reference book. Instead it is both a clinical discussion of chronic diseases and an exposition on the treatment of elderly patients. It admirably fulfils its purpose. HENRY S. SIMMS

Health—Safety—Growth Series: *Gaining Health (Grade V)—By C. E. Turner, Juanita McD. Melchior and Grace Voris Curl. Boston: Heath,* 1941. 296 pp. Price, $.76.

Cleanliness and Health Protection (Grade VI)—By C. E. Turner, Juanita Mc.D. Melchior and Grace Voris Curl. Boston: Health, 1941. 244 pp. Price, $.76.

Working for Community Health (Grade VII)—By C. E. Turner, C. E. Burton and Grace Voris Curl. Boston: Heath, 1941. 276 pp. Price, $.84.

Building Healthy Bodies (Grade VIII)—By C. E. Turner and C. E. Burton. Boston: Heath, 1941. 308 pp. Price, $.88.

Any health worker wishing to stimulate school administrators to a new interest in health teaching in the schools, or any school man desiring to show health officers or supervising nurses what modern educational practice is offering in the classroom, should investigate this series which has a book for each grade from the 5th through junior high school.

Health educators disagree as to the emphasis to be placed on presenting anatomical and physiological facts. This reviewer believes Turner and his collaborators have struck the happy mean. The functioning of knowledge at home, in school and in the community is stressed. And the facts are expressed in vocabulary which does not belong to the physiologist or doctor but to the child's own age level. Over and over stress is placed on how to make the best use of everything you have in order to get what *you* as an individual want out of life. The story telling technic is not overdone. It is so extremely well done in fact that in the last of the series one wishes for more.

The high points of this series are: (1) Each book has a fresh approach adapted to the grade level; (2) the organization of the materials makes them adaptable to various teaching methods; (3) the books are rich in objective material for testing knowledge and behavior, as well as giving an opportunity for original work; (4) the classroom background within which the series was developed has contributed a simplicity of approach that is often lacking in other readers; (5) the standards of accuracy are high; and (6) the carefully prepared word-list for vocabulary building in each book is a fine teaching device.

Among the excellent series of health readers made available during the past year this set is further distinguished for successfully attaining that difficult quality of talking directly *to* children instead of *about* them. They are friendly books and pupils will like them.

DOROTHY B. NYSWANDER

The Baker Memorial, 1930–1939— *By Haven Emerson, M.D. New York: Commonwealth Fund,* 1941. 75 pp. Price, $.50.

After many years of preliminary discussion and planning the Baker Memorial, "dedicated to the care of people of limited means," admitted its first patients in March, 1930. It was made possible by gifts amounting to $1,900,000 plus contributions by the Julius Rosenwald Fund and the Baker Memorial, parent institution, the Massachusetts General Hospital, to meet operating deficits which during the first 9 years and 10 months of operation amounted to $387,150.60. This was exclusive of depreciation and interest. The years 1938 and 1939 each showed a small operating surplus. The average

daily census of patients increased from 87 in 1930 to 208 in 1939 and the percentage of beds occupied, from 54 per cent in the former year to 86 per cent in the latter.

The average Baker Memorial patient had an annual personal income between $2,000 and $2,500; he remained in the hospital 13.4 days; he paid $66.06 for professional services, and for hospitalization expenses, $119.09. Thus his hospital experience cost him about 8.5 per cent of his annual income. In 1939 the 300 doctors who had patients under their care in the Baker Memorial received from them an average of $1,290 in professional fees, all of which are collected by the hospital in behalf of the doctors.

That the Baker Memorial has won the approval of that segment of the population it was intended to serve seems clear from its steady growth, from its increasingly satisfactory financial experience, and from the testimony of its patients. Ten questions were sent to 1,766 patients; 943 replied; with only unimportant exceptions the patients who replied were well satisfied with their hospital experience.

The support and approval of the physicians of the Boston area, both those on the closed staff and those without the privilege of taking care of their patients in the hospital, seems to have been nearly unanimous. A minority of the staff were dissatisfied with the inclusive medical fee of $150; this provision was accordingly somewhat relaxed after 1938 in instances in which patients remained in the hospital more than 3 months.

The theories, policies, and practices of the Baker Memorial provide much helpful material for other communities considering an attempt to provide adequate medical care for the economic group between ward patients and private patients. But it is not irrelevant to point out that the Baker Memorial was founded under circumstances hard to duplicate. It has had generous financial backing; its parent hospital is one of the great institutions of clinical investigation and teaching; many of the professional staff are distinguished leaders in their fields of work, their professional standards are high, and many have reputations which inevitably would draw patients to the hospital.

In this interesting report Dr. Emerson has made available data accumulated during the first 10 years of the Baker Memorial experience. His approach has been quantitative and his emphasis, like that of nearly every one who writes on problems of medical care, has been on the economic and administrative problems. In these areas his analysis is clear and comprehensive. One could wish that he had extended his analysis to the quality of medical care at the Baker Memorial. A study of the care and completeness with which the patients' records are kept; the percentage of autopsies; the attendance at autopsies; the discrimination with which the laboratory facilities are used; the promptness with which diagnostic and therapeutic discoveries of proven value are adopted; and other similar criteria of quality would have been of great interest. Also an analysis of the Baker Memorial as an educational influence might fittingly have been included. Information on such aspects of a hospital's social responsibilities as staff meetings, educational opportunities for interns and residents, pathological conferences, library facilities, and, not least in importance, the educational influence on the physicians of the Boston area who refer patients to the hospital but are not on the staff, would have been appropriate.

G. M. MACKENZIE

How to Prevent Goiter—*By Israel Bram. New York: Dutton,* 1941. 182 pp., 21 ills. Price, $2.00.

This small volume is divided into 17

short chapters. The author states that the book is for the purpose of enlightening the public on diseases of the thyroid. The two principal disease groups (1) simple goiter and (2) exophthalmic goiter, are conservatively discussed, and no attempt is made to confuse the reader by reviewing the many other associations of goiter, which the author could have done by stating that goiter is a symptom rather than a disease.

The headings of some of the chapters, as for example "The Healthy Thyroid," "The Unhealthy Thyroid," and "What and When Is a Goiter?" may make these chapters more salable but one wonders whether such conservative chapter headings as "Normal Thyroid," "Abnormal Thyroid," and "What Is Goiter?" would not have had just as much appeal with less of the tabloid features of journalism.

The desirability and even purpose of such books may be questioned. Not enough is known by experts in this field to present any comprehensive and simple picture for laymen and, as always, a little knowledge may be a dangerous thing. DAVID MARINE

BOOKS RECEIVED

MODERN MEDICINE. ITS PROGRESS AND OPPORTUNITIES. By Netta W. Wilson and S. A. Weisman. New York: Stewart, 1942. 218 pp. Price, $2.00.

DOCTORS ANONYMOUS. THE STORY OF LABORATORY MEDICINE. By William McKee German. New York: Duell, Sloan & Pearce, 1941. 300 pp. Price, $2.75.

DENTAL EDUCATION IN THE UNITED STATES. By John T. O'Rourke and Leroy M. S. Miner. Philadelphia: Saunders, 1941. 367 pp. Price, $5.00.

TIME AND THE PHYSICIAN. The Autobiography of Lewellys F. Barker. New York: Putman, 1942. 350 pp. Price, $3.50.

BIOLOGY FOR BETTER LIVING. By Ernest E. Bayles and R. Will Burnett. New York: Silver Burdett, 1941. 754 pp. Price, $2.28.

FOOD VALUES IN SHARES AND WEIGHTS. By Clara Mae Taylor. New York: Macmillan, 1942. 92 pp. Price, $1.50.

MINERALS IN NUTRITION POPULARLY EXPLAINED. By Z. T. Wirtschafter. New York: Reinhold, 1942. 175 pp. Price, $1.75.

FOOD AND DRUG REGULATION. By Stephen Wilson. Washington: American Council on Foreign Affairs. 177 pp. Price, Cloth, $3.25; Paper, $2.50.

FIRST AID PRIMER. By Hermann Leslie Wenger and Eleanor Sense. New York: Barrows, 1942. 104 pp. Price, $1.00.

NURSING IN DISEASES OF THE EYE, EAR, NOSE AND THROAT AS PRACTICED AT THE MANHATTAN EYE, EAR AND NOSE HOSPITAL. 7th edition. Philadelphia: Saunders, 1942. 313 pp. Price, $2.50.

RABIES. By Leslie T. Webster. New York: Macmillan, 1942. 168 pp. Price, $1.75.

LANE MEDICAL LECTURES: THE LYMPHATIC SYSTEM. Its Part in Regulating Composition and Volume of Tissue Fluid. By Cecil K. Drinker. Stanford University: Stanford University Press, 1942. 235 pp. Price, $2.25.

GUIDES TO SEX HORMONE THERAPY. Prepared and Published by the Schering Medical Research Division, Schering Corporation, Bloomfield, N. J., 1942. Three volumes.

A PRIMER ON THE PREVENTION OF DEFORMITY IN CHILDHOOD. By Richard Beverly Raney and Alfred Rives Shands. Elyria: National Society for Crippled Children of the United States of America, 1941. 188 pp. Price, $1.00.

PROCEEDINGS AND PAPERS OF THE TWELFTH ANNUAL CONFERENCE OF THE CALIFORNIA MOSQUITO CONTROL ASSOCIATION. Held at Agriculture Hall, University of California, Monday, December 15 and Tuesday, December 16, 1941. Price, $1.00.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Something New Under the Sun—A census of the sewerage systems and disposal methods in the several states. The report shows very substantial progress in the treatment of community sewage. In five states the percentage of the population now served approaches 90. Raw sewage however is still a first class sanitary hazard in many, many sections of the country.

ANON. A Summary of Census Data on Sewerage Systems in the United States. Pub. Health Rep. 57, 12:409 (Mar. 20), 1942.

A Word to Wise Child Hygienists—As tonsillectomy may be done at any time of year, it appears inadvisable to have this operation performed during the poliomyelitis season. Avoiding tonsillectomies then would probably eliminate many cases of the grave and highly fatal bulbar form.

ANON. Tonsillectomy and Poliomyelitis. J.A.M.A. 118, 12:980 (Mar. 21), 1942.

Odd Items from Everywhere Department—National rose hip tea is now on sale (in England), one teaspoonful being sufficient to supply the daily vitamin C need of a child. Plans are under way for the collection of another 200 tons of rose hips on a nationwide scale by teachers, children, *et al.* to be converted into syrup, by selected firms, for use by young children.

ANON. Editorial Notes. J. Roy. Inst. Pub. Health & Hyg. 5, 2:27 (Feb.), 1942.

Ammunition for Health Educators—Nutritionists especially will be interested in these two papers, one reporting upon experimental animals, the other on patients. Together they leave no doubt but that a vitamin C deficiency decreases the tensil strength of healing wounds. Normal healing may be produced by adequate vitamin C intake postoperatively.

BARTLETT, M. K., *et al.* Vitamin C and Wound Healing. New Eng. J. Med. 226, 12:469 (Mar. 19), 1942.

Reëmployment of the Tuberculous—Though there is no evidence that contact with the tuberculous can reactivate quiescent lesions in an employee, the compensation commission's hypothesis that such exposure does reactivate old lesions (therefore tuberculosis in an ex-patient employee is compensable) has caused hospitals to discontinue the employment of ex-patients. This is hurtful both to the institutions and the rehabilitated ex-patients.

BRAHDY, L. Arrested Tuberculosis and Hospital Employment. J. Indust. Hyg. & Toxicol. 24, 3:53 (Mar.), 1942.

Effective Lay Participation—With professional guidance, lay groups can (1) stimulate adequate health services, (2) support competent officials, (3) obtain appropriations, (4) develop widespread understanding of administrative projects, (5) carry on health educational programs. Ways by which they can be organized and guided is the meat of this excellent paper.

BUCK, C. E. The Citizen's Rôle in Public Health. Pub. Health Nurs. 34, 3:129 (Mar.), 1942.

Premarital Tests—Through the six years of their enactment, some weird premarital legislation has been written

upon the law books, and the 1941 crop succeeded in adding confusion to the existing diversity of procedures. A uniform law, and reciprocity, would add to the undoubted value of this legislation.

FORSTER, G. F., and SHAUGHNESSY, H. J. Premarital Examination Laws in the United States. J.A.M.A. 118, 10:790 (Mar. 7), 1942.

Serious Answer to Nutritional Doubts—Evidence presented here that dietary inadequacies and malnutrition are of frequent occurrence in these United States, and that the nutritional status of an appreciable part of the population can be improved, should be studied by any health worker who may have been impressed by the repeated insistence of one of our widely read medical publicists that malnutrition is seldom seen in the celebrated clinics of the country.

JOLLIFFE, N., *et al.* The Prevalence of Malnutrition. J.A.M.A. 118, 12:944 (Mar. 21), 1942.

All about Soap—An answer to almost any question one might raise about soaps and the newer sulfonated detergent products will be found in this extensive review of the subject. Sanitarians will be particularly interested in the discussion which leads to the conclusion that mechanical removal of pathogenic organisms from the skin by the emulsification of resident insoluble oils, plays a greater rôle in "sterilization" through scrubbing, than by the actual germicidal action of the detergent used.

LANE, C. G., and BLANK, I. H. Cutaneous Detergents. J.A.M.A. 118, 10:804 (Mar. 7), 1942.

Flea- vs. Louse-borne Typhus—Evidence is presented to show that in China, as in Mexico, flea-borne typhus may exist alongside the louse-borne disease, and that epidemics may originate from sick rats. Whether all modern epidemics spring from rodent reservoirs cannot yet be answered.

LIU, W. T., *et al.* Typhus Fever in Peiping. Am. J. Hyg. 35, 2:231 (Mar.), 1942.

Public Health Takes on a New Urgency—Here is a brief summary of the Public Health Service's increasing wartime activities in caring for an augmented merchant marine, an ever-expanding industrial population, civilian health problems in war industry areas, and the vicinity of cantonments. This is a total war, we need often to be reminded.

PARRAN, T. Wartime Problems of the Public Health Service. J.A.M.A. 118, 13:1033 (Mar. 28), 1942.

Immunology of Viruses—There is reason to believe that in those virus diseases which confer lasting immunity, the virus establishes itself permanently in, and lives happily with, the body cell. In those diseases like the common cold, the superficial cells carrying the virus are thrown off to be replaced by new, and unaffected cells, and immunity is thus made temporary indeed.

RIVERS, T. M. Immunity in Virus Infections. Science 95, 2457:107 (Jan. 30), 1942.

Apparent Failure for Influenza Vaccine—Your attention was called in an earlier bibliography to the introductory part of an exhaustive study upon influenza immunization. The last chapter is now published, and with it the conclusion that as employed in these studies, influenza virus vaccines failed to reduce the incidence of illnesses related to influenza A or any acute respiratory diseases.

SIEGEL, M., *et al.* A Study in Active Immunization against Epidemic Influenza and Pneumococcus Pneumonia at Letchworth Village. Am. J. Hyg. 35, 2:186 (Mar.), 1942.

After the Fury Subsides—Do you remember all the dire forebodings

raised by the viewers-with-alarm when premarital blood tests were proposed? Well, after 6 years of experience, the first state to impose this dreadful incentive to immorality on its helpless population finds that marriages have increased, that illicit sex relations have not been encouraged, and that, instead, the law has proved an important method of discovering syphilis, a protection to the innocent, a means of encouraging adequate treatment, a potent preventive of congenital syphilis, and a law of enormous educational value.

TALBOT, H. P. Six Years of the Premarital Blood Test Law in Connecticut. Monthly Health Bull. (Connecticut) 56, 3:62 (Mar.), 1942.

More about Cancer in the South—In Birmingham nearly half the white male cases were skin cancer, a proportion higher than in any other city in the series reported upon. Of the white female cases a third were genitourinary, a quarter were skin, and a fifth were breast cancer cases. There is much else in the report of interest to all health workers.

SOMMERS, H. J. The Incidence of Cancer in Birmingham and Jefferson County, Alabama, 1938. Pub. Health Rep. 57, 11:377 (Mar. 13), 1942.

For Your Housing Problem—Are you interested in employing a yardstick for the measuring of housing conditions to guide inspection and enforcement programs? Here, then, is an item upon the technic which might be employed by a local agency on a sampling basis or for a whole substandard area.

TWICHELL, A. A., and SOLOW, A. An Appraisal Technique for Urban Problem Areas as a Basis for Housing Policy of Local Governments. Pub. Health Rep. 57, 9:285 (Feb. 27), 1942.

CORRECTION

Correction for page 154, paragraph 1, last sentence, American Public Health Association Year Book, 1941–1942

Substitute the following:

In view of the difficulties in classifying hemolytic streptococci according to serologic type, it was recommended, by implication, that typing not be included in routine practice until the procedures have been perfected.

ASSOCIATION NEWS

SEVENTY-FIRST ANNUAL MEETING

ST. LOUIS, MO., OCTOBER 27–30, 1942

Headquarters

MUNICIPAL AUDITORIUM

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Richard Philpott, 122 E. 42nd St., Lily-Tulip Cup Corp., New York, N. Y., Director of Public Health Relations

George J. Raschka, B.Ch.E., 2617 Clinton Ave., S., Minneapolis, Minn., Asst. Public Health Engineer, Div. of Ind. Health, State Dept. of Health

Food and Nutrition Section

Elizabeth Dyar, Ph.D., Colorado State College, Fort Collins, Colo., Assoc. Professor of Nutrition

Lawrence V. Keefe, B.C.S., 122 E. 42nd St., Lily-Tulip Cup Corp., New York, N. Y., Manager, Nestrite Division

Ann Kestel, R.N., Box 332, Burley, Ida., Cassia County Public Health Nurse

Charles T. Mentzer, Jr., B.S., 8450 Nemours Bldg., Wilmington, Dela., Asst. to Director of Sales (Fine Chem. Div.), E. I. duPont de Nemours and Co., Inc.

Thomas H. Vaughn, Ph.D., J. B. Ford Co., Wyandotte, Mich., Director of Research

Maternal and Child Health Section

Demarious C. Badger, M.D., 200 E. Taylor, Hobbs, N. M., Private Practice in Pediatrics

Jesse M. Horn, M.D., Medical Arts Clinic, Box 790, Brownwood, Tex., City Health Officer and Member, Venereal Disease Clinic

Harold E. Odegard, D.M.D., 212 Ave. D., Snohomish, Wash., Dentist, County Health Dept.

Edward Press, M.D., State Dept. of Health, Charleston, W. Va., Asst. Director, Div. of Maternal and Child Hygiene

Public Health Education Section

Helen Beckley, Ph.B., 45 Second St., San Francisco, Calif., Secty. of Health Council, Community Chest of San Francisco

Estelle H. Kezer, State Div. of Crippled Children, Helena, Mont., Orthopedic Field Supervisor

Dr. Nathan Kobrin, 486–78th St., Brooklyn, N. Y., Dentist and Editor, "Dental Outlook"

Jean B. Pinney, 927–15th St., N.W., Room 609, Washington, D. C., Assoc. Director, American Social Hygiene Assn.

Helen Ronayne, 871 Valle Vista, Vallejo. Calif., Supervisor, Solano County Health Dept.

Editha Stone, M.A., 2 Baldwin St., New Brunswick, N. J., Instructor, Health and Physical Education, New Jersey College for Women

Public Health Nursing Section

Lydia C. Arndt, R.N., B.S., Dubuque Visiting Nurse Assn., Dubuque, Iowa, Director

Gladyce L. Badger, 628–28th Ave., San Francisco, Calif., Director of Nursing, American Red Cross, Pacific Area

Catherine Bastress, M.N., Box 547, Wrangell, Alaska, Public Health Nurse, Territorial Dept. of Health

H. Lillian Bayley, R.N., State Health Dept., Raleigh, N. C., Asst. Public Health Nursing Consultant

Louise H. Brown, Box 567, Willcox, Ariz., Staff Nurse, Cochise County Health Service

Margaret F. Dunnigan, Box 1734, Fairbanks,

Alaska, Community Public Health Nurse, Territorial Dept. of Health

Florrie L. Erb., B.S., 315 Holderness St., S.W., Atlanta, Ga., Instructor, Public Health Nursing, State Dept. of Public Health

Velma Forrest, Box 152, Petersburg, Alaska, Territorial Nurse, Territorial Dept. of Health

Helen H. Frederick, R.N., 111 Dean St., Woodstock, Ill., District Public Health Nurse

Jewell Gaffney, 2915 Connecticut Ave., N.W., Washington, D. C., Public Health Nurse, Health Dept.

Violet P. Golden, R.N., Weston Public Schools, School St., Weston, Mass., Red Cross Public Health Nurse

Marian Hartvedt, R.N., B.A., North Central Dist. Health Unit, Potlatch, Ida., Public Health Nurse

Jane Hibbard, B.S., P. O. Box 1931, Juneau, Alaska, Senior Public Health Nurse, Territorial Dept. of Health

Margaret P. Judd, R.N., B.S., Town Hall, Kittery, Me., Public Health Nurse, U. S. Public Health Service

O. Fay Kopke, R.N., 205 Peasley, Boise, Ida., Public Health Nurse, City Health Unit

Virginia D. Lawrence, R.N., Box 205, Rigby, Ida., Junior Public Health Nurse, Jefferson County Health Unit

Sylvia B. Levitt, M.A., M.N., St. Louis Co. Health Dept., Clayton, Mo., Senior Public Health Nurse, U.S.P.H.S.

Ann Lucek, R.N., City-County Health Unit, Boise, Ida., Staff Nurse

Alba A. Mastorgi, B.S., 21 Ashley St., Hartford, Conn., Public Health Nursing Consultant, State Dept. of Health

Vera M. Mitchell, R.N., 52 Downer Place, Aurora, Ill., Staff Nurse, Aurora Public Health Assn.

Gertrude E. Morris, R.N., B.S., 2705 Bainbridge Ave., Bronx, N. Y., Asst. Supervisor, Henry Street Visiting Nurse Service

Rosa L. Puhlman, C.P.H., 1560 Dixie, Charleston, W. Va., Health Nurse, Kanawha County Health Dept.

Inez M. Thompson, Gulf Health Dept., Wharton, Tex., Staff Public Health Nurse

Armenia R. Townsend, R.N., 253 New Jersey Ave., Absecon, N. J., Public Health Nurse, Bureau of Maternal and Child Health, State Dept. of Health

Epidemiology Section

Paulo Cesar de Azevedo Antunes, M.D., 615 N. Wolfe St., Baltimore, Md., Student, Johns Hopkins School of Hygiene and Public Health

Reginald A. Frary, M.D., 3000 Reisterstown Rd., Baltimore, Md., Student, Johns Hopkins School of Hygiene and Public Health

Ray E. Trussell, M.D., Medical Laboratories, Iowa City, Iowa, Instructor, College of Medicine, Univ. of Iowa

Unaffiliated

George T. Caldwell, M.D., Baylor Univ., College of Medicine, Dallas, Tex., Professor of Pathology

Rachel E. Hoffstadt, Ph.D., Dept of Bacteriology, Univ. of Wash., Seattle, Wash., Professor of Bacteriology

Fred M. Langsam, M.D., Indian Service Hospital, Bethel, Alaska, Physician in Charge

William W. Mitchell, 304 Ash St., Pullman, Wash., Student, Washington State College

Fred L. Peterson, 311 City Hall, Portland, Ore., Commissioner of Public Affairs in Charge of Health

John W. Spies, M.D., Univ. of Texas, Medical Branch, Galveston, Tex., Head, Dept. of Preventive Medicine and Public Health

Trawick H. Stubbs, M.D., 2087 Ridgewood Drive, N.E., Atlanta, Ga., Asst. Surgeon, U. S. Public Health Service

Robert K. Wilson, M.D., 201 Montezuma Rd., Montgomery, Ala., Consultant, Venereal Disease Control, Bureau of Preventable Disease, State Health Dept.

DECEASED MEMBERS

A. Elizabeth Bigelow, R.N., Meriden, Conn., Elected Member 1935, Public Health Nursing Section

Walter S. Frisbie, Washington, D. C., Elected Member 1925, Elected Fellow 1930, Food and Nutrition Section

C. Curtis Hudson, M.D., Greensboro, N. C., Elected Member 1918, Elected Fellow 1922, Health Officers Section

Walter C. Klotz, M.D., New York, N. Y., Elected Member 1920, Elected Fellow 1923, Epidemiology Section

Martha Tracy, M.D., Dr.P.H., Philadelphia, Pa., Elected Member 1940, Health Officers Section

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WANTED: The following issues of the *American Journal of Public Health*—July and August, 1941; and January, 1942. The Association will be glad to pay postage.

PROGRESS ON MERIT SYSTEM PROJECT

THE membership will be interested in knowing of the progress being made by the Committee on Merit Systems, a subcommittee of the Committee on Professional Education. It will be recalled that the Association was asked by the Children's Bureau and the U. S. Public Health Service to assist in the development of merit systems in the several states. Funds for the first year's work have been provided by several states.

With the able assistance of Milton Rose, M.D., formerly Professor of Public Health at the University of Pennsylvania, the committee has developed a file of examination questions as recently used, and studies have been carried out to discover the best ways of adapting modern methods of personnel selection to the public health field. Dr. Rose has now been called to the West Coast to serve with the American Red Cross. The committee has been fortunate in securing temporarily the services of Dorothy Deming, R.N., formerly Director of the National Organization for Public Health Nursing, who is serving as subject matter consultant in the field of public health nursing. As a specialist in test construction the services of Cecil Brolyer have been loaned temporarily by the Children's Bureau. Mr. Brolyer has had a long experience in the field of test construction with the Children's Bureau and the Social Security Board.

Among the needs felt by the several states, that for items in public health nursing is most urgent and the committee has therefore gone ahead on this phase of its work. Under the general direction of George H. Ramsey, M.D., Dr.P.H., Chairman of the subcommittee, a plan has been evolved to use twenty younger public health nurses for test construction. A series of 4 evening lectures on the rudiments of test construction have been given these nurses, who have purposely been selected from among those in junior positions and among those actively engaged in field work in the belief that their knowledge of actual conditions will best fit them to act as subject matter consultants. At the conclusion of this course the nurses have begun the production of objective type test items which are then cleared through a group of senior public health nurses in positions of instruction or administration who act as members of a final jury. The questions, or items as they are called in this field, are then assembled in a reserve from which, on request, examinations will be constructed for the use of state merit system councils.

In a similar way it is expected that test construction can be carried out in other fields, using specialists from these fields as test constructors under the guidance of a qualified test technician. The resulting examinations it is expected will serve to appraise the abilities and knowledge of applicants as adequately as any tests can accomplish this purpose with our present knowledge.

PUBLIC HEALTH NURSES

THE Merit System Committee of the American Public Health Association is experimenting with certain possible types of items for future use in examinations for public health nursing positions. The committee will have room 788 at the Palmer House, Chicago, during the Biennial Convention, May 18–22, and would appreciate having as many nurses as possible take these tests in order that some preliminary information may be obtained regarding the usefulness of these types of items. Nurses may take the tests anonymously and will be given their scores, but no interpretations can be attached to the scores.

APRIL MEETING OF THE COMMITTEE ON PROFESSIONAL EDUCATION

ALL the members of the Committee on Professional Education were present at the meeting on April 17 in New York with the exception of Dr. John E. Gordon who is in England. The committee unanimously adopted a Memorandum presented by Dr. W. P. Shepard of San Francisco, *Chairman*, regarding the Minimum Educational Facilities Necessary for the Postgraduate Education of Those Seeking Careers in Public Health, which is published in this issue. This Memorandum should be of immediate use to teaching institutions, appointing bodies, and candidates for professional careers in public health. It reflects the variety of educational resources which are essential for the proper training of persons in various specialties of public health. The committee hopes that it will serve to direct attention to excellent facilities that are available and make less likely the development of courses under auspices which, in the nature of the case cannot be regarded as adequate, even in the emergency.

George H. Ramsey, M.D., Chairman of the Subcommittee on Merit Systems, presented a report of current activities which is summarized on page 559.

The Committee on Professional Education adopted a simplified outline for handling future reports covering the training and experience of persons engaged in public health and approved a routine for handling these reports and maturing them into official declarations of the Association.

A preliminary report on the Educational Qualifications of Health Educators prepared by the subcommittee of which Clair E. Turner, Dr.P.H., is Chairman, was received by the committee. This report will replace the one on the Educational Qualifications of School Health Educators which was previously approved by the Governing Council. The Executive Board will be asked to authorize the withdrawal of the earlier report from circulation, since it has already served its usefulness. Because of the demand for a statement on qualifications of health educators, the committee authorized the distribution of the new report in its preliminary form to interested individuals.

Ralph E. Tarbett, C.E., Chairman of the Subcommittee on the Educational Qualifications of Professional Personnel in Sanitation, reported that there was under way reconsideration of the subcommittee's report, having in mind the comments of the Conference of State Sanitary Engineers and others on the subject.

Other subcommittees having reports finally approved and published, presented statements which were considered. These dealt with the educational qualifications of health officers, public health nutritionists, industrial hygienists, public health statisticians, public health nurses, and public health nurses in industry.

New reports from subcommittees were received on the educational qualifications of laboratory personnel, maternal and child health specialists, professional workers in mental hygiene, specialists in cancer control, venereal disease control officers, and public health dentists.

For purposes of the committee's work, professional education has been defined for the time being to mean public health training at the graduate level, or that subsequent to basic or legally recognized professional training. The committee does not overlook the importance of sub-professional levels but recognizes that the problems of this group are so different from those of the professional worker that

they must be separately considered.

Interesting reports were received from Lowell J. Reed, Ph.D., representing the Association of Schools of Public Health, and from Harry S. Mustard, M.D., representing the Association of American Medical Colleges, in relationship to the teaching of public health. Consideration was also given to the budgetary provision being made for the emergency training of public health workers and supplemental funds available through various channels for physicians, dentists, public health nurses, and engineers, under the provisions of accelerated training.

It was decided to provide for a subcommittee on the educational qualifications of school physicians and for a subcommittee on qualifications for secretaries of voluntary health agencies.

The members of the Committee on Professional Education present included William P. Shepard, M.D., *Chairman*, Reginald M. Atwater, M.D., *Secretary*, Edward S. Godfrey, Jr., M.D., Ira V. Hiscock, Sc.D., George H. Ramsey, M.D., Lowell J. Reed, Ph.D., Wilson G. Smillie, M.D., Ralph E. Tarbett, C.E., and Henry F. Vaughan, Dr.P.H. In addition, guests included John L. Rice, M.D., President of the Association, Huntington Williams, M.D., member of the Executive Board, Harry S. Mustard, M.D., Editor of the *Journal*, Mary J. Dunn, R.N., representing Pearl McIver, R.N., a member of the committee, Benjamin G. Horning, M.D., W. D. Stovall, M.D., and Clair E. Turner, Dr.P.H.

Health Conservation Contests' National Health Honor Roll

Winners in the 13th Annual City Health Conservation Contest	Winners in the 8th Annual Rural Health Conservation Contest
Detroit, Mich.	Alger-Schoolcraft Counties, Mich.
Evanston, Ill.	Arlington County, Va.
Greenwich, Conn.	Davidson County, Tenn.
Hackensack, N. J.	Fayette County, Ky.
Hartford, Conn.	Forsyth County, N. C.
LaSalle, Peru, Oglesby, Ill.	Gallatin County, Mont.
Louisville, Ky.	Gibson County, Tenn.
Madison, Wis.	Glynn County, Ga.
Memphis, Tenn.	Lauderdale County, Miss.
Milwaukee, Wis.	Madison County, Ky.
Newton, Mass.	Saginaw County, Mich.
Racine, Wis.	Santa Barbara County, Calif.
Reading, Pa.	Thurston County, Wash.
Schenectady, N. Y.	Whitman County, Wash.

These Contests are conducted annually by the Chamber of Commerce of the United States with the coöperation of the American Public Health Association. The Rural Health Conservation Contest is financed by the W. K. Kellogg Foundation, and the City Health Conservation Contest is financed by the Metropolitan Life Insurance Company.

EMPLOYMENT SERVICE

The Association Employment Service seeks to bring to the attention of appointing officers the names of qualified public health personnel and to act as a clearinghouse on employment. This is a service of the Association conducted without expense to the employer or employee.

From the registry of persons available, selected announcements are published from time to time. Appointing officers may obtain lists of all registrants on request.

Address all correspondence to the Employment Service, American Public Health Association, 1790 Broadway, New York, N. Y.

ARIZONA MERIT SYSTEM COUNCIL

The Merit System Council for the Arizona State Department of Social Security and Welfare and State Department of Health will probably shortly announce merit examinations for positions in those departments as follows:

State Director, Local Health Administration	$350–400	
Director Maternal and Child Hygiene	350–400	
Director, Local Health Unit	350–400	and $300–350
Health Officer-in-Training	300–350	
Director of Sanitary Engineering	300–350	
Sanitary Engineer	200–250	
Director, Public Health Laboratory	300–350	
Senior and Junior Bacteriologist-Serologist	165–215	and $115–165 respectively
X-ray Technician	165–190	
Director Public Health Nursing	215–265	
Nursing Consultant, special fields	175–200	
Supervising Public Health Nurse, local unit	175–200	
Senior and Junior Public Health Nurse, local unit	150–175	and $125–150 respectively
Public Health Nurse-in-Training	100–125	
Director Health Education	215–265	
Nutrition Consultant	215–265	
Vital Statistician	175–225	
Medical Social Worker	165–190	
Child Welfare Consultant	200–250	

Competition is open on a nation-wide basis. Professional registration in Arizona required before appointment for certain classes. Closing date for receipt of applications will probably be about June 15.

Application blanks, information regarding qualification requirements, conditions governing filing of applications, and detailed descriptions of the various classes of positions may be secured from the Merit System Council, Room 208, Home Builders Building, Phoenix, Ariz.

GEORGIA STATE MERIT SYSTEM ADMINISTRATION

The Supervisor of Examinations of the Georgia State Welfare Department announces competitive examinations for filling positions in the Public Assistance, Crippled Children, and Child Welfare Divisions. In the Crippled Children Division the salary ranges are minimum $1,800, maximum $2,280 for the position of Medical Social Worker, Orthopedic Field Nurse, and Physical Therapy Technician; for District Orthopedic Field Nurse a minimum of $1,920, maximum of $2,400; Physical Therapy Consultant a minimum of $2,400, maximum of $2,880; Orthopedic Nursing Consultant and Medical Social Consultant begin at a minimum of $2,700 and range to a maximum of $3,180; Medical Director of the Crippled Children Services begin at a minimum of $4,200 with a maximum of $5,400.

All of these positions are open to competitive assembled examinations except the Medical Director of the Crippled Children Services which is an unassembled examination. The examinations are based upon a rating of training and experience, a written test, and an oral interview. Each eligible who is appointed from the adequate register will be required to serve a probational period of 6 months as is the usual custom in Civil Service and Merit System agencies.

Georgia State residence is not required of an applicant in order to participate in the above examinations.

U. S. CIVIL SERVICE COMMISSION

The Commission has announced unassembled examinations for Junior Public Health Nurse at $1,800 a year and Junior Graduate Nurses at $1,620 a year, under which the training and age requirements of announcements No. 88 and 103 of 1941 have been amended. Persons interested should communicate with the U. S. Civil Service Commission in Washington or obtain the amended announcements at any first or second class post office.

The Commission announces unassembled examinations for Home Economists in 5 different grades at $2,600 to $5,600 a year. Interested persons should apply to the Commission for *Circular 195* on Home Economics.

PHYSICIANS NEEDED IN CANAL ZONE

The U. S. Civil Service Commission announces an examination to secure physicians for clinical service in the Panama Canal Zone. Graduation from a class A medical school subsequent to May 1, 1920, is required, and the applicant must be under 50. 25 to 35 years of age preferred. Entrance salary $4,000. Persons interested should communicate with the U. S. Civil Service Commission, Washington.

POSITIONS AVAILABLE

Physician with either public health training or experience in local health department administration to serve as health director in a county health department in mid-western state. Salary $4,000 and $500 travel (flat rate). Well established department with offices in attractive little city of 10,000. Write **Box T**, Employment Service, A.P.H.A.

Wanted: Trained Public Health Nurse, starting salary $1,500 per year and traveling expense, increase to $1,620 within 6 months. Saginaw County Health Dept., Saginaw, Mich.

Western state department of health will consider applications from physicians to fill four existing vacancies among county health officers, one vacancy in venereal disease control and positions as laboratory technicians. Write **Box S**, Employment Service, A.P.H.A.

County Public Health Nurses for New Mexico. Must have four months' post-graduate instruction under one of the recognized public health nursing courses and one year's experience. Must drive and have a car. Address inquiry to State Health Department, Santa Fe, N. M.

PUBLIC HEALTH ENGINEER

Responsible professional public health engineering involving field investigations and office studies in the application of sanitary measures. The more difficult engineering and sanitation field surveys include supervision over public water supplies, sewerage systems and sewage treatment plants and review of plans for same, and promotion and supervision of sanitation programs. Minimum qualifications: Training and experience equivalent to 3 years' civil engineering experience, including 2 years in public health or sanitary engineering; *or* completion of an academic year of graduate study and a year's experience in sanitary or public health engineering; *and* graduation from a college of recognized standing with a major course in civil or sanitary engineering. The salary range is $205 to $250 per month depending upon experience. Apply **Box E**, Employment Service, A.P.H.A.

OTHER VACANCIES

Southwestern State Health Department seeks 2 physicians for assignment to district health units, personally to conduct several small venereal disease clinics on a rotating schedule. Experience preferred but not required. Salary $3,000, plus actual travel allowance not to exceed $1,200. Write **Box V**, Employment Service, A.P.H.A.

Middle western city, 125,000 population, seeks well trained and experienced Health Officer on full-time, with competence to administer a department and teach public health to medical students. Salary $5,000 to $5,500 per annum. Write **Box K**, Employment Service, A.P.H.A.

The New Mexico State Department of Public Health will consider applications for the position of Assistant Director of the Maternal and Child Health Division and for Dental Health Consultant of that Division; also for the position of Nutrition Consultant. Address inquiries to the State Department of Public Health, Santa Fe, N. M.

Wanted: Trained Public Health Nurse, starting salary $1,500 per year and traveling expenses. Increase may be expected within 6 months. Shiawassee County Health Department, Corunna, Mich.

Wanted: Nurse for county health work. Salary $1,800 per year with travel allowance (additional) of $500 per year. Address District Health Department 2, West Branch, Mich.

Instructor in Bacteriology, Medical School, large midwestern university, M.D. (or Ph.D. or D.Sc. in Bacteriology); Male. Salary $1,800 to $2,500 according to age and experience. Write **Box D**, Employment Service, A.P.H.A.

POSITIONS WANTED

ADMINISTRATIVE

Teaching or administrative position desired by physician, aged 48. Experienced teacher in preventive medicine and public health, now employed at prominent medical school; 20 years' experience in municipal health administration and epidemiology. **A-491**

Physician, B.S., M.D., and M.S.P.H., University of Michigan, aged 35, experienced city-county health administration and as director university student health service. Will consider permanent responsible position offering good income. **A-492**

Physician, age 32, 5 years' clinical and administrative experience in venereal diseases, wishes administrative position in venereal disease control, preferably at state level. **A-490**

Physician, aged 28; M.D. Rush; M.P.H. Harvard; seeks administrative position under first class supervision. **A-496**

WOMEN PHYSICIANS TRAINED IN PUBLIC HEALTH

Woman aged 34, M.D., University of Basle, Switzerland, M.S.P.H. DeLamar Institute, Columbia University. U. S. citizen. Excellent references. Especially interested in industrial hygiene. **A-493**

Woman aged 41, M.D. Columbia University, M.S.P.H. DeLamar Institute, experienced in epidemiology and research, seeks position offering administrative experience. **A-494**

Woman physician, aged 48, M.D., University of Vienna. Excellent European pediatric experience. Seeks position in pediatrics, administration or statistical research. **A-495**

HEALTH EDUCATION

Teacher and research worker, man, Ph.D., age 52. Extensive record as college professor of biology and hygiene and investigator, for the past two years engaged in research. **H-499**

Health Educator, Negro, man with background of High School administration and M.S.P.H. from University of Michigan, seeks position in Health Education. Public agency or educational field. Excellent references. **H-497**

Woman, M.S. in public health, excellent graduate training in education, 8 years' experience as business executive (sales and publicity). Just completed year's research in community education. Seeks good administrative position. **H-496**

Health Educator, M.A. in Education, 10 years' background in community organization for public health education, also teaching of personal and community health at high school and college levels. Public health nurse, able to teach mental and social hygiene as well as general health education. East preferred. **H-498**

Health Educator. Man with M.S. in preventive medicine and public health. Negro. Seeks position in Health Education or field work with official or nonofficial agency. **H-500**

Woman with master's degree in health education, 12 years' successful experience in public school and college teaching, administration and research. Will consider position in normal school, public schools, or in official or nonofficial health agencies. Prefers South or East. Available at once. **H-501**

LABORATORY

Milk Sanitarian and Technologist, age 37, Ph.D., Bacteriology, Wisconsin, 10 years' experience in milk and food sanitation from industrial and official angle, seeks administrative position with opportunity for research or investigational work preferred. **L-381**

Chemist, Sc.D., Biochemistry, Johns Hopkins University. Age 31. Public health laboratory experience, teaching experience. Desires position with promise of advancement, preferably in commercial organization. **L-461**

Bacteriologist, young man 28, with B.S. in industrial science, experienced in newspaper work, salesmanship and now employed in state department of health laboratory, seeks position as bacteriologist or doing promotional work of public health nature. **L-465**

STATISTICAL

Woman with academic, business and research experience in vital statistics, seeks a position in the vital statistics division of a state or city health department, preferably as registrar. **S–459**

Experienced and well trained public health nurse, with background of tuberculosis, venereal disease, school, industrial, and generalized services, will shortly be available for appointment. Three years as director of state nursing service. Experienced as university teacher of public health nursing. M.A., New York University. **M–449**

Advertisement

Opportunities Available

PUBLIC HEALTH NURSES—(a) Director of nurses for hospital unit in western college; public health training and experience required; $1,800–$2,000. (b) Supervisor for Visiting Nurses Association, midwest city; two assistants; car furnished, all expenses; $1,800. (c) Generalized service; responsibility for public health nursing in schools; $1,800, liberal mileage allowance; Northwest. (d) Staff nurse for home delivery service; degree, public health certificate required; $1,800, travel expenses. PH5–1, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

PUBLIC HEALTH PHYSICIANS—(a) Physician with public health administrative experience; faculty appointment, university medical school; woman eligible; rank dependent upon qualifications. (b) Woman physician to head department of health, young women's college; South. (c) Pediatrician for interesting position, state public health department; $4,800, traveling expenses; Midwest. (d) Public health physician; man or woman; if not trained, training provided; state department. (e) Student health physician; state university; opportunity to combine duties with training leading to M.C. in public health. (f) Woman physician to conduct lay educational program in cancer control; considerable traveling; Midwest. PH5–2, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

Advertisement

Situations Wanted

YOUNG WOMAN PHYSICIAN—Well trained in public health medicine and with successful record as county health officer desires position affording opportunity to specialize in syphilology in which, too, she has had some special training. PH5–3, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

PUBLIC HEALTH ADMINISTRATOR—Taught bacteriology and basic medical sciences for 5 years after receiving academic degree and before entering medical school; 12 years with a municipal health department during which time he served as director for 7 years; has made many valuable contributions to professional literature; knows the scientific as well as practical side of public health medicine. PH5–4, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

BACTERIOLOGIST—Desires to re-locate; B.A., M.Sc., Ph.D. (in Bacteriology), eastern schools; 3 years, bacteriologist, state public health laboratories; past several years, instructor, department of bacteriology, state university; not likely to be called to military service. PH5–6, Medical Bureau (Burneice Larson, Director), Palmolive Building, Chicago.

NEWS FROM THE FIELD

SUMMER SCHOOL COURSES IN PUBLIC HEALTH

While the following list does not show all universities and technical schools offering summer courses in public health, it represents those which have replied to a questionnaire sent out by the American Public Health Association. Subjects covered may be ascertained by writing directly to the schools listed.

University of Alabama, University, Ala.
June 8–August 29

Boston University, Boston, Mass.
July 6–August 15

University of California, Berkeley, Calif.
June 29–August 7

University of California at Los Angeles, Los Angeles, Calif.
June 29–August 7

The Catholic University of America, Washington, D. C.
June 27–August 8

University of Chicago (Department of Nursing Education), Chicago, Ill.
June 23–August 1; August 3–September 12

Teachers College, Columbia University, New York, N. Y.
July 7–August 14

Cornell University, Ithaca, N. Y.
June 29–August 8

Duke University, Durham, N. C.
June 10–July 20

Eastern Washington College of Education, Cheney, Wash.
June 18–July 17; July 20–August 19

George Peabody College for Teachers, Nashville, Tenn.
June 8–August 21

Harvard School of Public Health, Boston, Mass.
April 27–August 1

University of Illinois, Urbana, Ill.
June 8–August 29

State University of Iowa, Iowa City, Ia.
June 8–July 31

Loyola University (School of Medicine), Chicago, Ill.
June 22–July 31

Marquette University (College of Nursing), Milwaukee, Wis.
June 29–August 4

Massachusetts Institute of Technology, Cambridge, Mass.
June 8–September 12

Michigan State College, East Lansing, Mich.
June 23–July 31

University of Michigan (School of Public Health), Ann Arbor, Mich.
June 15–August 8 and/or October 2; August 8 and/or October 2

University of Minnesota, Minneapolis, Minn.
June 15–July 24; July 27–August 28

National Society for the Prevention of Blindness, 1790 Broadway, New York, N. Y. (in coöperation with the four following colleges and universities):

Teachers College, Columbia University, New York, N. Y.
July 6–August 14

George Peabody College for Teachers, Nashville, Tenn.
June 22–August 1

State Teachers College, Buffalo, N. Y.
June 29–August 7

Wayne University, Detroit, Mich.
June 29–August 7

New Jersey State Teachers College at Montclair, Upper Montclair, N. J.
July 6–August 14

University of New Mexico, Albuquerque, N. M.
June 8–August 1

New York School of Social Work, 122 East 22nd Street, New York, N. Y.
July 20–July 31

New York University (School of Education), Washington Square, New York, N. Y.
Intersession, June 8–July 3; Summer Sessions, July 6–August 14

University of North Carolina (School of Public Health), Chapel Hill, N. C.
June 11–July 21; July 22–August 28

University of Oregon, Eugene, Ore.
June 13–July 17; July 18–August 21

University of Pennsylvania (Department of Nursing Education), Philadelphia, Pa.
June 22–August 1

University of Pittsburgh (School of Nursing), Pittsburgh, Pa.
June 22–July 18
Rutgers University, New Brunswick, N. J.
June 29–August 9
St. John's University, Collegeville, Minn.
June 8–August 1
Simmons College, Boston, Mass.
June 29–August 7
Stanford University, Stanford University, Calif.
June 18–August 29
Syracuse University (Department of Public Health Nursing, College of Medicine), Syracuse, N. Y.
July 6–August 14
University of Utah, Salt Lake City, Utah.
June 15–July 23; Post Session, July 27–August 21
Vassar College, Poughkeepsie, N. Y.
June 22–August 1
Medical College of Virginia, Richmond, Va.
June 29—or any week or month following, to continue for 1, 2, or 3 months from time of registration
Wagner Memorial Lutheran College, Grymes Hill, Staten Island, N. Y.
June 8–July 18; July 27–September 5
University of Washington, Seattle, Wash.
June 23–August 21
West Virginia University, Morgantown, W. Va.
June 8–July 17
College of William and Mary, Williamsburg, Va.
June 15–September 12
University of Wisconsin, Madison, Wis.
June 29–August 7

CONFIDENTIAL REPORT ON BOMBING AVAILABLE

WALTER D. BINGER, Chairman of the National Technological Civil Protection Committee, on his return from England as a consultant to the Secretary of War, has prepared a confidential report on his observations on many of the problems associated with the bombing of cities. In this report he discusses in considerable detail both the effects of such bombing and the administrative and technical practices which have been developed in England to prevent damage as well as to correct the effects of destruction.

The report is not available for general distribution, but a copy has been placed in the office of the Commanding Officer of each Army Corps Area in the United States. It can be reviewed in that office, by permission of the Commanding Officer, upon request by public officials who have a concern with and are interested in the subjects covered. The report deals with a number of engineering and medical aspects of public health control under wartime conditions. It sheds considerable light upon the problems of maintaining utility service under these conditions of stress.

The American Public Health Association is represented on the National Technological Civil Protection Committee by Abel Wolman, Dr.Eng., Professor of Sanitary Engineering, Johns Hopkins University, and Chairman of the Executive Board, A.P.H.A.

NEW YORK STATE DEPARTMENT OF HEALTH PERSONNEL FOR MILITARY DUTY

MEMBERS of the Medical and Sanitary Engineering staffs of the New York State Department of Health called for military duty, with date of commencing such duty:

Daniel P. McMahon, M.D., District State Health Officer, February 26, 1942
Warren W. Lacey, M.D., Assistant District State Health Officer, April 1, 1941
Malcolm A. Bouton, M.D., Medical Consultant in Social Hygiene, April 13, 1942
Alfred H. Dobrak, M.D., Epidemiologist-in-training, June 1, 1941
Charles A. Agar, Senior Sanitary Engineer, April 1, 1942
Stanley T. Barker, Assistant Sanitary Engineer, November 11, 1940
Robert N. Clark, Assistant Sanitary Engineer, March 30, 1941
Andrew J. Fuller, Assistant Sanitary Engineer, December 30, 1940
Harly M. Riley, Assistant Sanitary Engineer, May 12, 1941
Ralph C. Sweeney, Assistant Sanitary Engineer, May 4, 1941
Lyndon M. Keller, Junior Sanitary Engineer, May 12, 1941
Nicholas Milone, Assistant Milk Sanitarian, April 6, 1942

PUBLIC HEALTH SERVICE LOANS PERSONNEL TO NEW YORK STATE

THE New York State Department of Health announces that 3 physicians and 4 sanitary engineers of the staff of the U. S. Public Health Service Reserve have been loaned to the department for the purpose of providing additional service in regions where the population has been increased because of defense industry activities and military concentrations.

Physicians

Vernon B. Link, M.D.
Albert Rubin, M.D.
Joseph A. Walsh, M.D. (Assigned to duty with State Emergency Medical Service, Office of Civilian Defense)

Sanitary Engineers

Donald B. Stevens
Abraham H. Chasick
John S. Marvin
Daniel A. Okun

TEN THOUSAND NURSES NEEDED FOR U. S. ARMY

ON March 13 it was announced that the U. S. Army Nurse Corps has immediate need for 3,000 qualified registered nurses and that, before the end of 1942, 10,000 in all will be needed to keep pace with the expanding demands from the Army. Eligible applicants must be of good character, unmarried, citizens of the United States, between 22 and 30 years of age, at least 5 ft. tall, and of standard weight for age and height. Graduation from an accredited high school giving a 4 year academic course and a school of nursing of approved standards is required, together with nursing registration. Applicants who can fulfil the requirements will be appointed to the grade of Nurse with the relative rank of Second Lieutenant. The pay is $840 a year in addition to maintenance and uniform equipment. Appointment authority for the Army Nurse Corps is vested in the Commanding Generals of the various Corps areas.

NORTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION

THE Northern California Public Health Association elected the following officers at its recent annual meeting in Berkeley:

President—John D. Fuller, M.D., Santa Cruz
President-elect—William A. Powell, M.D., Martinez
Vice-President—Edward A. Reinke, Berkeley
Secretary—Mrs. Ann W. Haynes, San Francisco
Treasurer—Helen Hartley, R.N., Stockton
Representative to A.P.H.A. Governing Council—Fred T. Foard, M.D., San Francisco
Representative to Regional Board of Western Branch—Edith P. Sappington, M.D., San Francisco

SOUTHERN CALIFORNIA PUBLIC HEALTH ASSOCIATION

AT a recent annual meeting of the Southern California Public Health Association the following officers were elected to serve for the current year:

President—Roy O. Gilbert, M.D., Glendale
President-elect—A. Victor Nasatir, M.D., Los Angeles
1st Vice-President—Charles W. Arthur, Pasadena
2nd Vice-President—J. F. Kessel, Ph.D., Los Angeles
Secretary-Treasurer—Floyd P. Wilcox, D.V.M., Los Angeles
Assistant Secretary-Treasurer—Alice Rorrison, Pasadena

DELAWARE PUBLIC HEALTH ASSOCIATION ORGANIZED

AT a recent meeting in Wilmington, the Delaware Public Health Association was organized, with the following officers:

President—Edwin Cameron, M.D., Dover
Vice-President—George H. Gehrman, M.D., Wilmington
Vice-President—Anna Van W. Castle, R.N., Wilmington
Secretary—G. Taggart Evans, Wilmington
Treasurer—Roger Murray, M.D., Wilmington

PROCUREMENT AND ASSIGNMENT SERVICE ROUTINE FOR THE SELECTION OF MEDICAL PERSONNEL

LIEUTENANT COLONEL S. F. SEELEY, Executive Officer of the Procurement and Assignment Service for Physicians, Dentists, and Veterinarians, Washington, D. C., speaking recently in New York City before the Medical Society of the County of New York, described the questionnaires from the Procurement and Assignment Service which were circulated in April to all physicians, dentists, and veterinarians, giving them an opportunity to state their preference should they be called, whether in military, governmental, industrial, or civil activity. Colonel Seeley described the national roster already prepared by the medical and dental professions for this purpose. The following routine has been established:

The selection of professional personnel in these classifications is to be on a voluntary basis as much as possible. To the original questionnaire to physicians sent out 23 months ago, more than 159,000 physicians responded, more than 50 per cent of whom were willing to volunteer for medical service in case of war. Of those under the age of 45 years, 63 per cent of the single physicians and 48 per cent of the married physicians even at that early date were willing to offer their services.

Colonel Seeley advised all physicians interested in knowing where their special experience would be most useful to apply to the Procurement and Assignment Service, Washington, which will be responsible for supplying the needs of the Army, Navy, Public Health Service, Civil Service Commission, Veterans' Administration, and the Children's Bureau, as well as other government services. No service will commission or employ a person unless cleared by the Procurement and Assignment Service. According to Colonel Seeley, the Navy will need a total of 3,000 doctors when its enlistment of 500,000 is reached. For the Army, 16,000 new physicians must be supplied by December 1. It is believed that there will be no difficulty in obtaining these officers on a voluntary basis without jeopardy to civilian needs.

Explaining how the service will operate, Colonel Seeley said that, when requests came from the Army or the Navy for doctors with special qualifications, these would be sorted immediately by punch cards from the 180,000 cards for physicians, and the names of physicians meeting the qualifications would be listed mechanically by the machine. One copy would go to the military service inquiring, the other would be broken into state lists and forwarded to the state chairmen of Procurement and Assignment to determine whether or not these men can be spared from their communities at present. According to Colonel Seeley, they will not be assigned to duty unless they can be replaced, if they are essential on staffs of teaching instructions, industrial plants, hospital staffs, public health services, or in private practice. It is expected, however, that all these essential positions ultimately can be filled by men over 45 or by those physically unfit for service under that age and by women doctors, of whom the nation now has 8,000 in active practice.

The responsible appointing officer would then get in touch with those specialists who are qualified and willing to serve and who are cleared by the local medical committee. It would then be possible to determine the rank each should receive in a commission, choosing these in consideration of the man's needs and of many other factors to be determined.

Every physician, dentist, and veterinarian who enrolls in the Procurement and Assignment Service will be

given a certificate to hang on his wall and be authorized to wear an insignia on his lapel showing that he has offered his services in his professional capacity to his country to win the war, even though it may be decided that he is needed in his own community.

CONTINUATION STUDY COURSE IN MILK PLANT OPERATION AT MICHIGAN

THE School of Public Health at the University of Michigan, Ann Arbor, is offering a series of in-service, non-credit training courses of which the first will be a course on May 12 and 13 for operators, owners, and managers of milk pasteurization plants. Other courses planned in this series will provide instruction for individuals employed in public health services, physicians and dentists in private practice, and other professional groups with a major interest in health science services, as well as courses for business, trade, and professional groups whose interests and occupations touch closely the problem of public health, such as hotel and restaurant managers, well drillers, plumbers, health board members, school officials, public works and service officials, probate judges, etc.

A special faculty group brought together for the occasion has been provided for the course for milk pasteurization plant operators. Emphasis will be laid on the health phases and sanitary aspects of the problem. The course is expected to represent a coherent unit of instruction rather than a series of unrelated lectures.

Participants in this course will include Henry F. Vaughan, Dr.P.H., Dean of the School of Public Health, Ann Arbor, James A. Tobey, Dr.P.H., New York, R. S. Breed, Ph.D., Geneva, N. Y., Milton J. Rosenau, M.D., Dean of the School of Public Health, University of North Carolina, Walter D. Tiedeman, C.E., New York State Department of Health, Albany, W. L. Mallman, Ph.D., Michigan State College, among others. The fee for registration and enrollment is $5.00. Further information can be obtained from the School of Public Health, University of Michigan, Ann Arbor.

EIGHTH PAN AMERICAN CHILD CONGRESS, WASHINGTON, MAY 2 TO 9

THE announcement has been made by the U. S. Department of State and the officials of the International American Institute for the Protection of Childhood, Montevideo, that the Eighth Pan American Child Congress will be held as scheduled May 2 to 9 in Washington with a program somewhat revised in consideration of the outbreak of war.

The entry of the United States and certain of the other American republics into the world conflict has necessitated reconsideration of the plans for the Congress in the light of war conditions and the resultant effects upon children. The Organizing Committee has consulted various individuals and organizations in the other American republics, as well as interested groups in the United States and the pertinent departments and agencies of the federal government in order to determine the basis upon which the meeting is to be organized under present circumstances. The committee has reached the conclusion that under war conditions it is even more important than in peace times to proceed with the plans for the promotion of inter-American coöperation in the protection and welfare of children.

It has been decided, therefore, in consideration of all the attendant circumstances to modify the scope and objectives of the Congress with a view to giving special emphasis to measures for maintaining and strengthening essential services to meet wartime needs, and to laying the foundations for closer inter-American collaboration for the protection of childhood in the war and post-war periods.

EXAMINATION FOR ASSISTANT SANITARY ENGINEERS, U. S. PUBLIC HEALTH SERVICE

AN examination for appointment as Assistant Sanitary Engineer in the regular commissioned corps of the U. S. Public Health Service has been announced for Washington, D. C., Cincinnati, New Orleans, Kansas City, and San Francisco on May 11. Candidates must be not less than 23 years nor more than 32 years of age and must have had at least 7 years of educational and professional training following high school, or experience equivalent thereto. They must have graduated from a reputable professional school granting a degree in engineering. In addition the applicant will be required to pass a satisfactory physical, academic, and professional examination. Compensation, including allowance for quarters and subsistence, will be $3,158 and $2,699 for officers with and without dependents, respectively.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

THE Department of Public Health at the Massachusetts Institute of Technology is offering an accelerated program of public health training beginning June 8 and allowing for the completion of a Master's degree on February 6. These training programs are organized for public health engineers, health educators, and public health laboratorians, as well as for administrators. Special summer courses are also being offered.

"HIDDEN HUNGER"

THE Honorable Paul V. McNutt, Administrator of the Federal Security Agency, asks the assistance of public health workers in having the recently released film entitled "Hidden Hunger," which is sponsored by the Office of Defense Health and Welfare Services, shown in their communities.

The purpose of the film is to help win the war on the food front, and it will soon be shown in theatres from coast to coast. Health workers can help in urging the public to see it when it is shown in their localities.

More complete information on the film appeared on page 319 of the March issue of the JOURNAL.

RESOLUTION ON THE DEATH OF JOHN P. RUSSELL, M.D.

THE California State Board of Public Health at its meeting in Sacramento on March 20 voted a resolution of regret at the sudden death of John P. Russell, M.D., Chief of the Industrial Hygiene Services of the California State Department of Health since 1937. The resolution points out that his services represented an outstanding and a brilliant effort in the development of industrial hygiene, both in peace times and, more recently, while the nation has been at war.

Dr. Russell died suddenly in Berkeley on March 17. Bertram P. Brown, M.D., the California Director of Public Health said, "In Dr. Russell there was that rare combination of successful administrator and sound research scientist. . . . The state was exceedingly fortunate in having Dr. Russell's assistance during the formative years of the industrial hygiene program."

PERSONALS

Central States

FRED L. ADAIR, M.D.,* Mary Campau Ryerson, Professor of Obstetrics and Gynecology, and Chairman of the Department, University of Chicago, The School of Medicine, Chicago, Ill., has been appointed Chief of the Division of Maternal and Child Hy-

* Fellow A.P.H.A

giene of the Illinois State Department of Health, Springfield.

CHARLES W. ATKINSON, of Boswell, Ind., has been reappointed as Health Officer of Benton County.

WILLIAM H. CAREY, JR., has been appointed as Regional Sanitary Engineer for the 6th and 7th Civilian Defense Regions with headquarters in Chicago, it is announced by the Office of Civilian Defense. Mr. Carey has been a public health engineer with the U. S. Public Health Service and Assistant Engineer with the Michigan State Department of Health.

ELTON R. CLARKE, M.D., of Kokomo, Ind., has been named Health Officer of Howard County.

JAMES H. CROWDER, M.D., II, of Sullivan, Ind., has been named Health Officer of Sullivan County.

ORVILLE A. DELONG, M.D., of Elizabethtown, Ind., has been reappointed as Health Officer of Bartholomew County.

CHARLES T. DOLEZAL, M.D., Assistant Clinical Professor of Medicine, Western Reserve University School of Medicine, Cleveland, Ohio, has been appointed Welfare Director of Cleveland.

GEORGE R. DOUGLAS, M.D., of Valparaiso, Ind., has been named Health Officer of Porter County.

THEODORE DOZOIS, PH.D., Bacteriologist and Serologist for the North Dakota State Department of Health laboratory at Bismarck, has resigned to accept a teaching and research position at Western Reserve University, Institute of Pathology, Cleveland, Ohio.

CHARLES L. FAHNESTOCK, M.D., of Lincoln, Neb., was appointed Supervisor of the State WPA Public Health Projects on February 1.

ROBERT M. FERGUSON, M.D., Indianapolis, has been named Director of Health District No. 4, with headquarters in Rising Sun. He succeeds DR. GEORGE M. BROTHER,† who is now Chief of the Bureau of the local health administration, Indianapolis. District No. 4 includes the counties of Dearborn, Ripley, Jefferson, Switzerlands, and Ohio.

WESLEY GILBERTSON, B.S., M.S.,† and HARRY G. HANSON, B.S., M.S., both of the Sanitary Engineering Division of the North Dakota State Department of Health, have been employed by the U. S. Public Health Service and are doing malaria control work at Atlanta, Ga.

JOHN S. GILKISON, M.D., of Shoals, Ind., has been named Health Officer of Martin County.

FRED W. GRAYSTON, of Huntington, Ind., has been reappointed as Health Officer of Huntington County.

JAMES R. HAMILTON, M.D., of Mitchell, Ind., has been appointed City Health Officer, to succeed the late JAMES D. BYRNS, M.D.

OLAF HAROLDSON, M.D., who has been doing private practice in North Dakota, has been appointed Health Officer for a city-county health unit at Minot, N. D. Dr. Haroldson and E. L. SEDERLIN, M.D.,† City Health Officer of Fargo, N. D., are doing advanced field work in the State of Missouri.

OSCAR S. HELLER, of Greenfield, Ind., has been reappointed as Health Officer of Hancock County.

JAMES E. KEELING, M.D., of Waldron, Ind., has been named Health Officer of Shelby County.

OLIVE E. LEE, R.N.,† Assistant State Supervisor of Public Health Nursing, North Dakota State Department of Health, has recently been appointed Consultant in Nursing for the American Red Cross and will be stationed in the midwestern district.

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* Fellow A.P.H.A.

† Member A.P.H.A.

Eastern States

CAPTAIN CHARLES C. AGAR, Senior Sanitary Engineer, in charge of sewage disposal plants, State Department of Health, Albany, N. Y., was called for active duty and reported to the Commanding Officer at Fort Dix on April 1.

ROBERT S. BREED, PH.D.,* Chief and Research Bacteriologist, New York State Agricultural Experiment Station, Geneva, N. Y., has for some months been on leave in Latin America, consulting on problems of milk production under the auspices of the Inter-American Committee for the Dairy Industry.

WILLIAM A. BRUMFIELD, M.D.,* Director of the Division of Syphilis Control of the New York State Department of Health, Albany, has been called for duty with the Army Medical Corps, effective April 13. In his absence JAMES H. LADE, M.D.,† will act as Director of the Division of Syphilis Control.

ALTON S. FELL, M.D., of Trenton, N. J., retired recently as Health Officer of Trenton, after a service of 43 years.

S. S. GOLDWATER, M.D.,* formerly Commissioner of Hospitals and now President of the Associated Hospital Service, New York, N. Y., was cited for "his invaluable contributions to the art of hospital planning and his outstanding services to the City of New York as Commissioner of Hospitals" at the 85th anniversary dinner of the New York Chapter of the American Institute of Architects on March 10.

JOHN HALL,* Field Supervisor with the Venereal Disease Division of the New Jersey State Department of Health, Trenton, N. J., has been appointed by the U. S. Public Health Service as a public health engineer on the staff of District No. 3, with headquarters in San Francisco, Calif. This district includes California, Oregon, Washington, and Nevada. Mr. Hall is Executive Secretary of the New Jersey Health and Sanitary Association.

A. J. LANZA, M.D.,* Assistant Medical Director of the Metropolitan Life Insurance Company, New York, N. Y., has been appointed Lieutenant Colonel in the Medical Corps of the Army and assigned to the Division of Industrial Health in the office of the Surgeon General, Washington, D. C. Colonel Lanza will be Chief of the Occupational and Military Hygiene Sub-Divisions, Preventive Medicine Division, and will have responsibility for initiating, coördinating, and supervising all activities of the Medical Department in connection with the industrial hygiene program of the Army.

A. HELEN MARTIKAINEN, M.P.H.,† Health Education Secretary of the Hartford Tuberculosis and Public Health Society, Hartford, Conn., has resigned, effective June 1, to become Assistant Health Education Consultant under the U. S. Public Health Service.

DR. EDWIN P. MAYNARD, JR., has been appointed Chairman of the New York Heart Association, the Heart Committee of the New York Tuberculosis and Health Association.

LIEUTENANT DANIEL P. MCMAHON,* District State Health Officer with headquarters in Amsterdam, N. Y., was called for active duty with the U. S. Navy and reported at the Norfolk Naval Hospital, Portsmouth, Va., on February 26. DR. C. A. SARGENT, who has been on sick leave for several months, replaces Lieutenant McMahon at Amsterdam.

CLAUDE C. PIERCE, M.D., who retired March 1 as a Medical Director of the U. S. Public Health Service after 42

* Fellow A.P.H.A.
† Member A.P.H.A.

years of service, latterly in charge of District 1, New York, N. Y., has been appointed Medical Director of the Planned Parenthood Federation of America., Inc., New York, N. Y. This organization was formerly the Birth Control Federation of America, Inc.

M. J. PLISHNER, M.P.H.,† of tLe staff of the Brooklyn Tuberculosis and Health Association, Brooklyn, N. Y., has been called to the Army as 1st Lieutenant in the Sanitary Corps and is now stationed at Ft. Story, Va.

JOHN W. TRASK, M.D., has been appointed Acting Health Commissioner of Pittsfield, Mass. Dr. Trask retired recently after a career in the U. S. Public Health Service, serving at one time as Assistant Surgeon General in charge of the Division of Sanitary Reports and Statistics and more recently as Medical Officer in charge of various Public Health Service hospitals.

Southern States

ERNEST A. COOK, M.D.,† of Wedowee, Ala., has been appointed Health Officer for Cleburne County, succeeding CORINNE S. EDDY, M.D., M.S.P.H.,† of Centerville, resigned.

HATCH W. CUMMINGS, M.D., is the new Health Officer of Hearne, Tex.

COLONEL GEORGE C. DUNHAM, M.D., DR.P.H.,* Washington, D. C., M. C., U. S. Army, on his appointment as Director of the Division of Health and Sanitation in the Office of Inter-American Affairs, U. S. Department of State, was appointed Brigadier General. The United States Congress confirmed the appointment on March 2 before General Dunham left for South America.

CHARLES JACK FISHER, M.D., of Montgomery, Ala., has been appointed Health Officer of Tuscaloosa County, effective April 1. He succeeds ARTHUR A. KIRK, M.D., who resigned after many years of service. Dr. Fisher, who is now in charge of the venereal disease program of the State Department of Health, formerly served as Health Officer of Butler County.

HUGH R. LEAVELL, M.D., DR.P.H.,* Health Officer of Louisville, Ky., has been appointed Director of Health for a newly consolidated health unit made up of the Louisville City and Jackson County Health Departments. The consolidation has been accomplished through an act of the Kentucky State Legislature and includes not only the health departments but the medical care programs, the City Hospital and the tuberculosis sanatorium.

THOMAS M. LITTLEPAGE, M.D., of Mount Sterling, Ala., has been appointed Health Officer of Choctaw County.

WILBUR D. LUNDQUIST, M.D.,† of Waynesboro, Ga., Health Commissioner of Burke County, will during the present year devote half of his time to Jenkins County, which has been without a Health Officer since ISBIN S. GIDDENS, M.D.,† of Millen, resigned to enter the Army.

HAROLD MARKS, M.D., Passed Assistant Surgeon (R), U. S. Public Health Service, has been assigned to the Medical Division of the Office of Civilian Defense. Dr. Marks recently has been at the National Institute of Health, Bethesda, Md., and was engaged in making medical surveys of medical care in defense communities.

ANTHONY RALPH MARSICANO, M.D., formerly of Coolidge, Ga., has been named Health Commissioner of Coffee County.

WILLIAM B. PATTERSON, M.D.,* of Brownfield, Tex., is the new Director of the five county health unit serving Dawson, Hockley, Yoakum, Gaines,

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* Fellow A.P.H.A.
† Member A.P.H.A.

and Terry Counties, with headquarters in Brownfield.

DUDLEY A. REEKIE, M.D., who has been Chief Medical Officer of the Tennessee Valley Authority, Chattanooga, has been appointed Regional Medical Officer of the First Civilian Defense Region, with headquarters in Boston. Dr. Reekie was formerly associated with the Kentucky State Board of Health as Field Director of County Health work.

LEONARD A. SCHEELE, M.D.,† Passed Assistant Surgeon, U. S. Public Health Service, has been assigned to the Medical Division of the Office of Civilian Defense, to serve on its Washington staff.

PAUL L. WERMER, M.D.,† of Gilmer, Tex., has been named Health Officer of Upshur County.

STEPHEN W. WILSON, M.D., of Gilmer, Tex., was recently chosen Director of the new City Health Unit at Atlanta, Tex.

Western States

D. M. BISSELL, M.D.,† has been appointed Health Officer of the City of San Jose, Calif., succeeding DR. H. C. BROWN, who died. Dr. Bissell was formerly Health Officer of Monterey County.

Hawaii

MARY H. LEMON,* Registrar General of Vital Statistics, Board of Health, Honolulu, is retiring from Public Service in Hawaii.

Canada

DR. KINGSLEY KAY,† who has been Acting Chief of the Division of Industrial Hygiene, Department of Pensions and National Health, Ottawa, Ont., is now on active service with the Royal Canadian Navy, Technical Branch.

Foreign

DR. ALBERTO RECIO,† has been appointed Director of Sanitation in the Ministry of Health and Welfare of Cuba, Havana.

JULES THEBAUD, D.D.S., of Port au Prince, Haiti, was appointed Director of the National Department of Hygiene and Public Health in Haiti on January 16. He has been director of the dental school in Port au Prince since 1928, and is the founder and President of the Sociéte Dentaire d'Haiti.

DEATHS

M. LOUISE DIEZ, M.D.,* Director of the Division of Child Hygiene of the Massachusetts Department of Public Health for the last 13 years, died April 11, at the age of 63. Before her State appointment, Dr. Diez had held positions in Philadelphia hospitals and in Providence, R. I. Then she served as obstetrician in the Division of Maternity, Infancy and Child Hygiene, New York State Department of Health, and as Associate Director of the same Division.

ROBERT W. HEGNER, PH.D., Professor of Protozoölogy at the Johns Hopkins University School of Hygiene and Public Health, Baltimore, Md., died on March 11, at the age of 62.

JOHN P. RUSSELL, M.D., M.S.P.H.,* of Berkeley, Chief of the Industrial Hygiene Services of the California State Department of Public Health, died on March 17.

ROCK SLEYSTER, M.D., psychiatrist of Milwaukee, Wis., died March 7. He was President of the American Medical Association in 1939.

MARTHA TRACY, M.D., DR.P.H.,† Assistant Director of the Philadelphia Department of Public Health, died March 22, at the age of 65. A graduate in 1904 of the Woman's Medical College in Philadelphia, Dr. Tracy received the Dr.P.H. in 1917 from

* Fellow A.P.H.A.
† Member A.P.H.A.

the University of Pennsylvania. In 1924 she became Professor of Preventive Medicine at the Woman's Medical College, and in 1931 Dean, in which position she served until she became Assistant Director of the Department of Public Health in 1940.

JOHN A. VOGLESON, Civil Engineer, Philadelphia, Pa., died on January 16. Major Vogleson was a Charter Fellow from 1923 to 1933.

CONFERENCES AND DATES

American Home Economics Association. Boston, Mass. June 21–24.

American Library Association. Wilwaukee, Wis. June 21–27.

American Medical Association—93rd Annual Meeting. Convention Hall, Atlantic City, N. J. June 8–12.

American Medical Women's Association. Atlantic City, N. J. June 6–7.

American Ophthalmological Society. Hot Springs, Va. June 1–3.

American Psychiatric Association. Hotel Statler, Boston, Mass. May 18–22.

American Public Health Association—71st Annual Meeting. Headquarters, Municipal Auditorium, St. Louis, Mo. October 27–30.

American Society for Clinical Investigation. Atlantic City, N. J. May 4.

American Society of Civil Engineers. Summer Meeting. Upper Mississippi. July.

American Society of Clinical Pathologists. Philadelphia, Pa. June 5–7.

American Society of Planning Officials—Joint Conference with National Conference on Planning. Indianapolis, Ind. May 24–28 (tentative).

American Therapeutic Society. Atlantic City, N. J. June 4–6.

American Water Works Association—
Pacific Northwest Section—Marcus Whitman Hotel, Walla Walla, Wash. May 7–9.
Ohio Section—Commodore Perry Hotel, Toledo, Ohio. May 14–15.
Annual Convention—Conference on Wartime Water Works Problems. The Stevens Hotel, Chicago, Ill. June 21–25.
Michigan Section — Park Place Hotel, Traverse City, Mich. September 9–11.
Western Pennsylvania Section — Roosevelt Hotel, Pittsburgh, Pa. September 18.
Minnesota Section—Lowrey Hotel, St. Paul, Minn. September 24–26.

Civil Service Assembly — Eastern Regional Conference. Albany, N. Y. June 5–6.

Dental Health Week. May 1–8.

Georgia Public Health Association. Atlanta. May 28–30.

Institute of Food Technologists. Minneapolis, Minn. June 15–17.

May Day—Child Health Day. May 1.

Michigan Public Health Association. Grand Rapids. November 11–13.

Missouri Public Health Association. Kansas City. May 7–9.

National Association of County Officials. Hollywood, Calif. May 20–23.

National Association of Housing Officials, Baltimore, Md. May 11–13.

National Boys and Girls Week. April 25–May 2.

National Conference of Social Work. New Orleans, La. May 10–16.

National Congress of Parents and Teachers Association. San Antonio, Tex. May 3–7.

National Council of State and Local Public Welfare Administrators. May.

National Education Association. Denver, Colo. June 27–July 2.

National Gastroenterological Association. Biltmore Hotel, New York, N. Y. June 3–6.

National Institute for Traffic Training—5th Annual Institute. New Haven, Conn. June 15–26.

National Noise Abatement Week. May 31–June 6.

National Organization for Public Health Nursing. Biennial Convention. Palmer House, Stevens Hotel and The Coliseum, Chicago, Ill. May 18–22.

National Tuberculosis Association—38th Annual Meeting, held jointly with American Trudeau Society—37th Annual Meeting, and National Conference of Tuberculosis Secretaries—20th Annual Meeting. Hotel Bellevue-Stratford, Philadelphia, Pa. May 6–9.

New York State Association of Milk Sanitarians—20th Annual Conference. DeWitt Clinton Hotel, Albany, N. Y. September 23–25.

New York State Association of Public Health Laboratories—26th Annual Meeting. Mary Imogene Bassett Hospital, Cooperstown, N. Y. May 18.

New York State Conference of Mayors and Other Municipal Officials. Syracuse, N. Y. June 8–10.

New York State Sewage Works Association—Spring Meeting. Hotel Ten Eyck, Albany, N. Y. June 5–6.